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Shoreline Situation Report MIDDLESEX COUNTY, VIRGINIA

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Chesapeake Research Consortium Report Number 48

Special Report In Applied Marine Science and Ocean Engineering Number 100 of the

VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia 23062

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Prepared by:

Natalie J. Whitcomb
Martha A. Patton
Margaret H. Peoples
Gary L. Anderson
Carl H. Hobbs III

U. S. DEPARTMENT OF COMMERCE NOAA
COASTAL SERVICES CENTER
2234 SOUTH HOBSON AVENUE
CHARLESTON, SC 29405-2413

Project Supervisors:

Robert J. Byrne
John M. Zeigler

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CHAPTER 1

INTRODUCTION

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INTRODUCTION

1.1 PURPOSES AND GOALS

It is the objective of this report to supply an assessment, and at least a partial integration, of those important shoreland parameters and characteristics which will aid the planners and the managers of the shorelands in making the best decisions for the utilization of this limited and very valuable resource. The report gives particular attention to the problem of shore erosion and to recommendations concerning the alleviation of the impact of this problem. In addition we have tried to include in our assessment some of the potential uses of the shoreline, particularly with respect to recreational use, since such information could be of considerable value in the way a particular segment of coast is perceived by potential users.

The basic advocacy of the authors in the preparation of the report is that the use of shorelands should be planned rather than haphazardly developed in response to the short term pressures and interests. Careful planning could reduce the conflicts which may be expected to arise between competing interests. Shoreland utilization in many areas of the country, and indeed in some places in Virginia, has proceeded in a manner such that the very elements which attracted people to the shore have been destroyed by the lack of planning and forethought.

The major man-induced uses of the shorelands are:

- Residential, commercial, or industrial development

- Recreation
- Transportation
- Waste disposal
- Extraction of living and non-living resources

Aside from the above uses, the shorelands serve various ecological functions.

The role of planners and managers is to optimize the utilization of the shorelands and to minimize the conflicts arising from competing demands. Furthermore, once a particular use has been decided upon for a given segment of shoreland, both the planners and the users want that selected use to operate in the most effective manner. A park planner, for example, wants the allotted space to fulfill the design most efficiently. We hope that the results of our work are useful to the planner in designing the beach by pointing out the technical feasibility of altering or enhancing the present configuration of the shore zone. Alternately, if the use were a residential development, we would hope our work would be useful in specifying the shore erosion problem and by indicating defenses likely to succeed in containing the erosion. In summary our objective is to provide a useful tool for enlightened utilization of a limited resource, the shorelands of the Commonwealth.

Shorelands planning occurs, either formally or informally, at all levels from the private owner of shoreland property to county governments, to planning districts and to the state and federal agency level. We feel our results will be useful at all these levels. Since the most basic level of comprehensive planning and zoning is at the county or city level, we have executed our report on that level although we realize some of the information

may be most useful at a higher governmental level. The Commonwealth of Virginia has traditionally chosen to place, as much as possible, the regulatory decision processes at the county level. The Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia), for example, provides for the establishment of County Boards to act on applications for alterations of wetlands. Thus, our focus at the county level is intended to interface with and to support the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

1.2 ACKNOWLEDGEMENTS

This report was prepared with funds provided by the Research Applied to National Needs (RANN) program of the National Science Foundation administered through the Chesapeake Research Consortium (CRC), Inc. The publication funds were provided through the Coastal Zone Management act of the Commonwealth of Virginia. Gaynor Williams and Dennis Owen assisted with data reduction and preparation. Ken Thornberry and Bill Jenkins prepared the photographs. Beth Marshall typed the manuscript. We thank the numerous other persons in both Virginia and Maryland who have criticized and commented upon our methods and ideas.



CHAPTER 2

APPROACH USED AND ELEMENTS CONSIDERED

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2.1 APPROACH TO THE PROBLEM

In the preparation of this report the authors utilized existing information wherever possible. For example, for such elements as water quality characteristics, zoning regulations, or flood hazard, we reviewed relevant reports by local, state, or federal agencies. Much of the desired information, particularly with respect to erosional characteristics, shoreland types, and use was not available, so we performed the field work and developed classification schemes. In order to analyze successfully the shoreline behavior we placed heavy reliance on low altitude, oblique, color, 35 mm photography. We photographed the entire shoreline of each county and cataloged the slides for easy access at VIMS, where they remain available for use. We then analyzed these photographic materials, along with existing conventional aerial photography and topographic and hydrographic maps, for the desired elements. We conducted field inspection over much of the shoreline, particularly at those locations where office analysis left questions unresolved. In some cases we took additional photographs along with the field visits to document the effectiveness of shoreline defenses.

The basic shoreline unit considered is called a subsegment, which may range from a few hundred feet to several thousand feet in length. The end points of the subsegments were generally chosen on physiographic consideration such as changes in the character of erosion or deposition. In those cases where a radical change in land use occurred, the point of change was taken as a boundary point of

the subsegment. Segments are a grouping of subsegments. The boundaries for segments also were selected on physiographic units such as necks or peninsulas between major tidal creeks. Finally, the county itself is considered as a sum of shoreline segments.

The format of presentation in the report follows a sequence from general summary statements for the county (Chapter 3) to tabular segment summaries and finally detailed descriptions and maps for each subsegment (Chapter 4). The purpose in choosing this format was to allow selective use of the report since some users' needs will adequately be met with the summary overview of the county while others will require the detailed discussion of particular subsegments.

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

The characteristics which are included in this report are listed below followed by a discussion of our treatment of each.

- a) Shorelands physiographic classification
- b) Shorelands use classification
- c) Shorelands ownership classification
- d) Zoning
- e) Water quality
- f) Shore erosion and shoreline defenses
- g) Potential shore uses
- h) Distribution of marshes
- i) Flood hazard levels
- j) Shellfish leases and public shellfish grounds
- k) Beach quality

a) Shorelands Physiographic Classification:

The shorelands of the Chesapeake Bay System may

be considered as being composed of three interacting physiographic elements: the fastlands, the shore and the nearshore. A graphic classification based on these three elements has been devised so that the types for each of the three elements portrayed side by side on a map may provide the opportunity to examine joint relationships among the elements. As an example, the application of the system permits the user to determine miles of high bluff shoreland interfacing with marsh in the shore zone.

For each subsegment there are two length measurements, the shore-nearshore interface or shoreline, and the fastland-shore interface. The two interface lengths differ most when the shore zone is embayed or extensive marsh. On the subsegment maps, a dotted line represents the fastland-shore interface when it differs from the shoreline. The fastland-shore interface length is the base for the fastland statistics.

Definitions:

Shore Zone

This is the zone of beaches and marshes. It is a buffer zone between the water body and the fastland. The seaward limit of the shore zone is the break in slope between the relatively steeper shoreface and the less steep nearshore zone. The approximate landward limit is a contour line representing one and a half times the mean tide range above mean low water (refer to Figure 1). In operation with topographic maps the inner fringe of the marsh symbols is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 2). Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the

shore. Extensive marsh is that which has extensive acreage projecting into an estuary or river. An embayed marsh is a marsh which occupies a reentrant or drowned creek valley. The purpose in delineating these marsh types is that the effectiveness of the various functions of the marsh will, in part, be determined by type of exposure to the estuarine system. A fringe marsh may, for example, have maximum value as a buffer to wave erosion of the fastland. An extensive marsh, on the other hand, is likely a more efficient transporter of detritus and other food chain materials due to its greater drainage density than an embayed marsh. The central point is that planners, in the light of ongoing and future research, will desire to weight various functions of marshes and the physiographic delineation aids their decision making by denoting where the various types exist.

The classification used is:

Beach

Marsh

Fringe marsh, < 400 ft. (122 m) in width

along shores

Extensive marsh

Embayed marsh, occupying a drowned valley or reentrant

Artificially stabilized

Fastland Zone

The zone extending from the landward limit of the shore zone is termed the fastland. The fastland is relatively stable and is the site of most material development or construction. The physiographic classification of the fastland is based upon the average slope of the land within 400 feet (122 m) of the fastland - shore boundary. The general classification is:

Low shore, 20 ft. (6 m) or less of relief;

with or without cliff

Moderately low shore, 20-40 ft. (6-12 m) of

relief; with or without cliff

Moderately high shore, 40-60 ft. (12-18 m) of

relief; with or without cliff

High shore, 60 ft. (18 m) or more of relief;

with or without cliff.

Two specially classified exceptions are sand dunes and areas of artificial fill.

Nearshore Zone

The nearshore zone extends from the shore zone to the 12-foot (MLW datum) contour. In the smaller tidal rivers the 6-foot depth is taken as the reference depth. The 12-foot depth is probably the maximum depth of significant sand transport by waves in the Chesapeake Bay area. Also, the distinct drop-off into the river channels begins roughly at the 12-foot depth. The nearshore zone includes any tidal flats.

The class limits for the nearshore zone classifications were chosen following a simple statistical study. The distance to the 12-foot underwater contour (isobath) was measured on the appropriate charts at one-mile intervals along the shorelines of Chesapeake Bay and the James, York, Rappahannock, and Potomac Rivers. Means and standard deviations for each of the separate regions and for the entire combined system were calculated and compared. Although the distributions were non-normal, they were generally comparable, allowing the data for the entire combined system to determine the class limits.

The calculated mean was 919 yards with a standard deviation of 1,003 yards. As our aim was to determine general, serviceable class limits, these calculated numbers were rounded to 900 and 1,000

yards respectively. The class limits were set at half the standard deviation (500 yards) each side of the mean. Using this procedure a narrow nearshore zone is one 0-400 yards in width, intermediate 400-1,400, and wide greater than 1,400.

The following definitions have no legal significance and were constructed for our classification purposes:

Narrow, 12-ft. (3.7 m) isobath located < 400 yards from shore

Intermediate, 12-ft. (3.7 m) isobath 400-1,400 yards from shore

Wide, 12-ft. (3.7 m) isobath > 1,400 yards

Subclasses: with or without bars
with or without tidal flats
with or without submerged vegetation

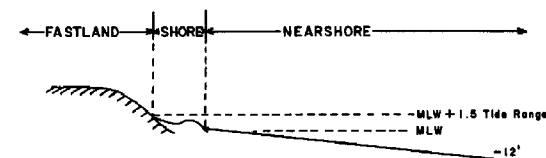


Figure 1 An illustration of the definition of the three components of the shorelands.

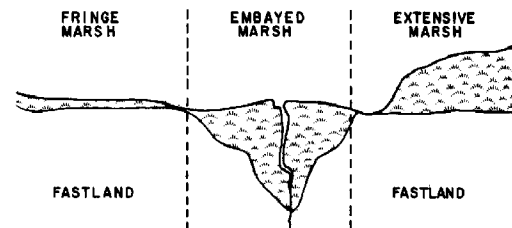


Figure 2 A generalized illustration of the three different marsh types.

b) Shorelands Use Classification:

Fastland Zone

Residential

Includes all forms of residential use with the exception of farms and other isolated dwellings. In general, a residential area consists of four or more residential buildings adjacent to one another. Schools, churches, and isolated businesses may be included in a residential area.

Commercial

Includes buildings, parking areas, and other land directly related to retail and wholesale trade and business. This category includes small industry and other anomalous areas within the general commercial context. Marinas are considered commercial shore use.

Industrial

Includes all industrial and associated areas. Examples: warehouses, refineries, shipyards, power plants, railyards.

Government

Includes lands whose usage is specifically controlled, restricted, or regulated by governmental organizations: e.g., Camp Peary, Fort Story.

Recreation and Other Public Open Spaces

Includes designated outdoor recreation lands and miscellaneous open spaces. Examples: golf courses, tennis clubs, amusement parks, public beaches, race tracks, cemeteries, parks.

Preserved

Includes lands preserved or regulated for

environmental reasons, such as wildlife or wild-fowl sanctuaries, fish and shellfish conservation grounds, or other uses that would preclude development.

Agricultural

Includes fields, pastures, croplands, and other agricultural areas.

Unmanaged

Includes all open or wooded lands not included in other classifications:

- a) Open: brush land, dune areas, wastelands; less than 40% tree cover.
- b) Wooded: more than 40% tree cover.

The shoreland use classification applies to the general usage of the fastland area to an arbitrary distance of half mile from the shore or beach zone or to some less distant, logical barrier. In multi-usage areas one must make a subjective selection as to the primary or controlling type of usage.

Shore Zone

Bathing
Boat launching
Bird watching
Waterfowl hunting

Nearshore Zone

Pound net fishing
Shellfishing
Sport fishing
Extraction of non-living resources
Boating
Water sports

c) Shorelands Ownership Classification:

The shorelands ownership classification used has two main subdivisions, private and governmental, with the governmental further divided into federal, state, county, and town or city. Application of the classification is restricted to fastlands alone since the Virginia fastlands ownership extends to mean low water. All bottoms below mean low water are in State ownership.

d) Water Quality:

The ratings of satisfactory, intermediate or unsatisfactory assigned to the various subsegments are taken from a listing at the Virginia Bureau of Shellfish Sanitation, based on information from water samples collected in the various tidewater shellfishing areas. The Bureau attempts to visit each area at least once a month.

The ratings are defined primarily in regard to number of coliform bacteria. For a rating of satisfactory the maximum limit is an MPN (Most Probable Number) of 70 per 100 ml. The upper limit for fecal coliforms is an MPN of 23. Usually any count above these limits results in an unsatisfactory rating, and, from the Bureau's standpoint, results in restricting the waters from the taking of shellfish for direct sale to the consumer.

There are instances, however, when the total coliform MPN may exceed 70, although the fecal MPN does not exceed 23, and other conditions are acceptable. In these cases an intermediate rating may be assigned temporarily, and the area will be permitted to remain open pending an improvement in conditions.

Although these limits are somewhat more stringent than those used in rating recreational waters

(see Virginia State Water Control Board, Water Quality Standards 1946, amended 1970), they are used here because the Bureau of Shellfish Sanitation provides the best areawide coverage available at this time. In general, any waters fitting the satisfactory or intermediate categories would be acceptable for water recreation.

e) Zoning:

In cases where zoning regulations have been established the existing information pertaining to the shorelands has been included in the report.

f) Shore Erosion and Shoreline Defenses:

The following ratings are used for shore erosion:

slight or none - less than 1 foot per year

moderate - - - - 1 to 3 feet per year

severe - - - - greater than 3 feet per year

The locations with moderate and severe ratings are further specified as being critical or noncritical. The erosion is considered critical if buildings, roads, or other such structures are endangered.

The degree of erosion was determined by several means. In most locations the long term trend was determined using map comparisons of shoreline positions between the 1850's and the 1940's. In addition, aerial photographs of the late 1930's and recent years were utilized for an assessment of more recent conditions. Finally, in those areas experiencing severe erosion field inspections and interviews were held with local inhabitants.

The existing shoreline defenses were evaluated as to their effectiveness. In some cases repetitive visits were made to monitor the effectiveness of recent installations. In instances where

existing structures are inadequate, we have given recommendations for alternate approaches. Furthermore, recommendations are given for defenses in those areas where none currently exist. The primary emphasis is placed on expected effectiveness with secondary consideration to cost.

g) Potential Shore Uses:

We placed particular attention in our study on evaluating the recreational potential of the shore zone. We included this factor in the consideration of shoreline defenses for areas of high recreational potential. Furthermore, we gave consideration to the development of artificial beaches if this method were technically feasible at a particular site.

h) Distribution of Marshes:

The acreage and physiographic type of the marshes in each subsegment is listed. These estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. The material in this report is provided to indicate the physiographic types of marshes and to serve as a rough guide on acreages until detailed surveys are completed. Additional information of the wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report by Marvin L. Wass and Thomas D. Wright, SRAMSOE Report No. 10, Virginia Institute

of Marine Science, 1969, and in other VIMS publications.

i) Flood Hazard Levels:

The assessment of tidal flooding hazard for the whole of the Virginia tidal shoreland is still incomplete. However, the United States Army Corps of Engineers has prepared reports for a number of localities which were used in this report. Two tidal flood levels are customarily used to portray the hazard. The Intermediate Regional Flood is that flood with an average recurrence time of about 100 years. An analysis of past tidal floods indicates it to have an elevation of approximately 8 feet above mean water level in the Chesapeake Bay area. The Standard Project Flood level is established for land planning purposes which is placed at the highest probable flood level.

j) Shellfish Leases and Public Grounds:

The data in this report show the leased and public shellfish grounds as portrayed in the Virginia State Water Control Board publication "Shellfish growing areas in the Commonwealth of Virginia: Public, leased and condemned," November 1971, and as periodically updated in other similar reports. Since the condemnation areas change with time they are not to be taken as definitive. However, some insight to the conditions at the date of the report are available by a comparison between the shellfish grounds maps and the water quality maps for which water quality standards for shellfish were used.

k) Beach Quality:

Beach quality is a subjective judgment based on such considerations as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.

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CHAPTER 3

PRESENT SHORELINE SITUATION

CHAPTER 3
PRESENT SHORELINE SITUATION OF
MIDDLESEX COUNTY, VIRGINIA

3.1 THE SHORELANDS OF MIDDLESEX COUNTY

Middlesex County is bounded on the north by the Rappahannock River, on the east by the Chesapeake Bay, and on the south by the Piankatank River. The shorelands reflect the county's predominantly rural character in that they are relatively undeveloped. Deltaville and Urbanna are the only fairly large population centers located on the shore. The shorelands in these areas are subject to somewhat heavy use throughout most of the year.

The fastland of Middlesex County ranges from low shore to high shore with some areas of artificial fill (see Table 1). The artificial fill is mainly used to fill in behind bulkheading for cosmetic purposes. Because 75% of the shoreline is low or moderately low shore, flooding can be a problem during times of abnormally high water. Most of the heavy flooding occurs during northeast storms which occur during the fall, winter, and spring. The northeast winds of these storms pile up water along Stingray Point and in the mouths of the Piankatank and Rappahannock Rivers. In the upper portions of the rivers, tidal marshes protect the fastland from severe flooding.

Tidal marshes, including fringe, embayed, and extensive marshes, comprise 67% of the county's shoreline (a tidal marsh inventory for Middlesex is forthcoming). All marsh areas should be preserved due to their ecological assets, and flood and erosion protection qualities. This is especially true for Dragon Swamp which is still a relatively unspoiled area of wetlands.

Thirty-three percent of the shoreline of this county is comprised of beaches. Most of the beaches are fairly wide and very clean. There are only two beaches in the county to which the general public has access. One is located next to the Norris Bridge (Segment 3) and the other is located on Stingray Point (Subsegment 5A).

The fastland in Middlesex County is mainly used for agricultural purposes or small housing developments. Many of these small housing developments are chiefly comprised of second or summer homes. Most of Middlesex County's population is dependent upon agriculture or shellfishing as a source of income. Thus, the development of the county should be controlled so that the water quality in the Rappahannock and Piankatank Rivers is not damaged.

3.2 SHORELINE EROSION IN MIDDLESEX COUNTY

The pattern of erosion of Middlesex County's shoreline is as irregular as the shoreline itself. The primary cause of erosion in the Chesapeake Bay system is wave action generated by local winds. The height and growth of waves is controlled by four factors: The overwater distance across which the wind blows (the fetch), the velocity of the wind, the duration of time that the wind blows, and the depth of the water. The weather patterns affecting the Chesapeake Bay area are such that the maximum winds occur during storms and frontal passages. The northeast storms that occur during the fall, winter, and spring attack the Chesapeake Bay's western shore. The winds and low barometric pressure associated with these "northeasters" affect the erosion situation by piling water up along the Bay's western shore. This storm surge

may be two or more feet above the normal high tide level. Because of the high water, the wave action is concentrated on the higher fastland, above the natural buffer provided by the beach or marsh. In addition to wave height, the direction at which waves impinge upon the shoreline controls the long shore transport of material. The transport of material along a beach is, in theory, the greatest when the waves break at an angle of forty-five degrees (to the shoreline).

The overall erosion situation of any particular segment may vary from year to year depending upon the frequency and intensity of the wave action and the mean sea level. The overall trend of the lower Chesapeake Bay is that of a rising sea level. Although the yearly rate of subsidence is low, through time this trend can be significant.

Beaches and marshes are natural barriers against the erosion of the fastland. The beaches absorb the incident wave energy and therefore inhibit or retard the erosion of the fastland. As beach material is attained from the erosion of the fastland, either at the site or at an up-drift site, the shape and size of any particular beach may change through time. Middlesex County, according to an unpublished VIMS study of the historical patterns and rates of shoreline retreat in Tidewater Virginia, ranks 16th among the Tidewater counties in loss of acres per mile of shoreline for the hundred years ending in 1950. The net loss, as an aggregate, is 1,230 acres or an average yearly retreat of 0.8 feet. The minimum estimated volume of the loss is 24,582,000 cubic yards. The greatest amount of erosion has occurred near Stingray Point in the

eastern section of the county where the average erosion rate has been 6.1 feet per year. Here the shore is exposed to the long fetches and heavy wave action of the Chesapeake Bay.

In addition to its open exposure, the fastland material, sands and gravels with some clay, offers little resistance to the waves. Residential development of the shoreline has brought an increased awareness of the severity of the erosion problem. Solutions to the problem have primarily been approved on an individual basis. Now, sections of this area are fairly well stabilized and protected with bulkheads, riprap, and groins. Attendant with this has been the disappearance of the beach along other sections of the shoreline, as sediment sources have been withdrawn from the littoral system. The early implementation of an overall plan with a unified approach to shoreline protection might have prevented some of the secondary or man-made problems. The best that can reasonably be expected is to attempt to retain or re-establish the beaches which exist. Two possible courses of action are (1) replenishment with a program of general beach nourishment and (2) site specifically designed structures to trap moving sands. A combination of these two actions, although more expensive, might be significantly beneficial to justify the increased cost. Groin systems are of limited value here as they depend on the littoral transport of sand along the shore. With the supply areas withdrawn from the system and the resulting decrease in littoral transport, groins would be only partially successful at retaining existing beaches. Re-establishment of the beaches will entail a detailed study of the area and a unified solution.

The Deltaville waterfront along the Rappahannock River, and that near Grinels have suffered severe erosion. This area has now been fairly well stabilized by the use of bulkheads and groins.

The beaches along the Rappahannock River in the vicinity of Urbanna have been severely eroded in the past. This problem has been intensified by the starvation of the beaches due to the Urbanna Creek jetty. Thus, despite the numerous shore protective structures in this area, the beaches are nonexistent.

Some undercutting of bluffs is occurring west of Grey's Point and in an area east of Bayport. These are both relatively unpopulated areas and despite the fact that trees are falling down these bluffs, no structures are endangered.

Elsewhere in the county, no particularly severe erosion occurs. All the areas of moderate erosion have been fairly well stabilized.

Shoreline erosion is considered a major problem only in the county's developed or developing areas. Here man's presence has led to the recognition of the problem and, in some cases, to its aggravation. Elsewhere in Middlesex there are no major structures endangered by erosion and the problem is not considered critical. If the problems of shoreline erosion are addressed before new development begins and an area plan of shore protection is adopted, the aggravated erosion witnessed in other areas might be prevented.

3.3 POTENTIAL SHORELANDS USE

Fifty percent of the shorelands in Middlesex County are unmanaged; however, development would be difficult due to lack of easy access. Also,

because most of the residents depend on the water or the land as a source of income, most of the land is already used for agricultural purposes.

The shore and nearshore areas could support more recreational use. There are, for example, only four campgrounds and two public beaches in the county. After considerations such as fresh water supply, sewage treatment or disposal, drainage, and soil analysis have been taken into account, it is possible that more campgrounds could be developed on the upper Piankatank River. The Rappahannock River has possibilities for other public beaches along its shoreline. However, any beaches should include adequate parking facilities and, if possible, bath houses. The utility of the public beach in Segment 3, near the Grey's Point campground, might be enhanced by the inclusion of bath houses, restrooms, and parking facilities.

Some residential development could be undertaken along the Piankatank River in Segments 5 and 6 and along the Rappahannock River in Segment 1. However, such development should be planned so as not to cause significant detrimental impact on the local environment.

Dragon Swamp, discussed in Subsegment 6B, is a remarkably well preserved marshland area. Canoeing trips, nature walks through the marsh, and bird watcher tours could be organized to take advantage of this very valuable area. However, the marshes should be left as undisturbed as possible.

Although there is room for further development in the county, none should be undertaken without careful planning. Middlesex County's greatest attractions are its quiet, rural atmosphere, and

clean beaches. Despite pressures to develop and
consume the county's shorelands, these features
should be preserved.

TABLE 1. MIDDLESEX COUNTY SHORELANDS PHYSIOGRAPHY, FASTLAND USE, OWNERSHIP (STATUTE MILES)

Physiographic, use and ownership classifi- cation	SHORELANDS PHYSIOGRAPHY										FASTLAND USE						OWNERSHIP	TOTAL MILES				
	FASTLAND					SHORE					NEARSHORE											
	LOW SHORE	MODERATELY LOW SHORE	MODERATELY HIGH SHORE	HIGH SHORE	ARTIFICIAL FILL	BEACH	FRINGE MARSH	EMBAYED MARSH	EXTENSIVE MARSH	ARTIFICIALLY STABILIZED	NARROW	INTERMEDIATE	WIDE	AGRICULTURAL	COMMERCIAL	RECREATIONAL	RESIDENTIAL	UNMANAGED, WOODED	UNMANAGED, UNWOODED	PRIVATE	FASTLAND	SHORELINE
Subsegment																						
1A	0.9	3.2	0.7	1.8		3.5	0.7			0.9		1.7	3.4		0.2		1.7	4.0	0.7	6.6	6.6	5.1
1B	10.0	21.6	3.6	6.2		4.7	13.6	4.2		0.2	12.2	3.2	3.0	9.1			7.3	21.1	3.9	41.4	41.4	22.7
2A	4.7	12.1	2.0	1.8		2.0	8.5	2.9		1.4	9.7	0.9	0.3	4.9	0.2		1.5	14.0		20.6	20.6	14.8
2B	5.6	7.0			0.4	1.0	7.3	1.5		1.6	6.5	1.1		2.4	0.9		2.8	6.9		13.0	13.0	11.4
2C	1.6	2.5	4.0	2.0	0.5	0.8	6.4	1.8		0.5	7.2	0.4		0.7	0.6	1.0	3.4	4.8		10.6	10.6	9.5
3	12.4	12.1				5.4	11.7	2.5	1.8	3.2		8.2		8.8		1.4	3.3	11.0		24.5	24.5	24.6
4	16.9	14.2	5.8			5.9	20.2	1.5	4.6	8.7	23.1	5.5	5.3	7.1	3.3		14.1	8.3	4.1	36.9	36.9	40.9
5A	11.0					1.0	5.1	0.9	0.4	3.6	6.0	2.3	0.2		2.4		7.1	1.5		11.0	11.0	11.0
5B	8.3	14.5			1.9	5.7	10.5	1.8		5.5	19.4	1.4		6.1	2.1		4.0	12.5		24.7	24.7	23.5
6A	4.9	5.1	0.2			1.8	5.3	0.9		1.7	5.6	3.1		1.9			3.0	4.7	0.6	10.2	10.2	9.7
6B	4.0	8.4	1.0	0.2		1.0	3.5	6.2	1.6	1.0	2.7			2.4	0.2		2.5	8.5		13.6	13.6	13.3
SUBTOTAL	80.3	100.7	17.3	12.0	2.8	32.8	92.8	24.2	8.4	28.3	92.4	27.9	12.2	43.4	9.9	2.4	50.7	97.3	9.3	213.1	213.1	186.5
% of SHORELINE						18%	50%	13%	4%	15%	70%	21%	9%									100%
% of FASTLAND	38%	47%	8%	6%	1%									20%	5%	1%	24%	46%	4%	100%	100%	

TABLE 2. PUBLIC, LEASED, AND CONDEMNED SHELLFISHING GROUNDS, MIDDLESEX COUNTY, VIRGINIA

Body of Water	Leased Ground		Condemned Ground		Public Ground
	Number of Tracts	Acreage	Area Number	Estimated Acreage	Estimated Acreage
Rappahannock River	454	10,523.9	51&53	1,045	
Hunting Creek	4	8.5			
Broad Creek	12	101.8	38	81	
Sturgeon Creek	19	141.6			
Bush Park Creek	3	125.0			
Mill Creek	21	142.8			
Locklies Creek	30	217.9			
Meachim Creek	14	62.3			
Whiting Creek	1	7.7			
Mud Creek	20	46.0			
Urbanna Creek	27	129.1	42	297	
Robinson Creek	24	140.3			
Lagrange Creek	24	203.3			
Weeks Creek	7	122.2			
Parrotts Creek	7	148.7			
Chesapeake Bay	1	2.2			
Fishing Bay	8	12.9			
Healys Creek	3	35.4			
Jacksons Creek	53	87.0			
Piankatank River	229	1,551.5			
Wilton Creek	8	69.2			
Piankatank River and Vacinity					14,112.2
Rappahannock River and Corrotoman River					55,185.1*
Total	945	13,879.3		1,423.0	69,297.3

* This value includes the approximately 10,000 acres of additional public ground as provided in Section 28.1-144 of the Code of Virginia.



FIGURE 3

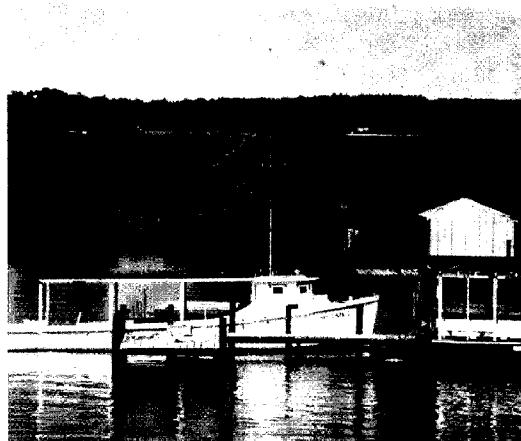


FIGURE 4

FIGURE 3: Bulkhead located NW of Coach Point along the Piankatomk Shores. The bulkhead is subject to flooding during high tide.

FIGURE 4: Wilton Point on the Piankatomk River, Subsegment 6A.

FIGURE 5: Jackson Creek in Subsegment 5A. The heavily developed shoreline is typical of the Deltaville area.

FIGURE 6: An overview of Stingray Point, Subsegment 5A.

FIGURE 7: Bluffs along Grey's Point in Segment 3. Note the slumping that is occurring.



FIGURE 5



FIGURE 6



FIGURE 7

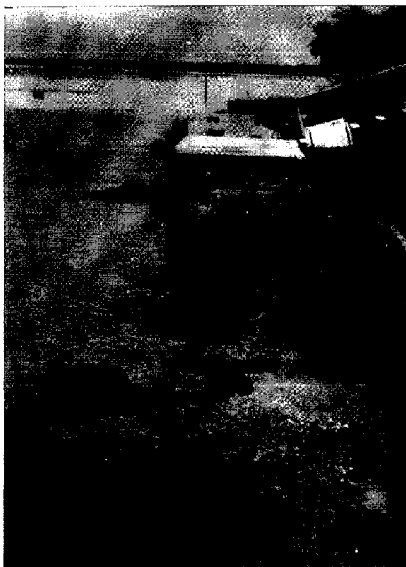


FIGURE 8

FIGURE 8: The Rappahannock River along Urbanna in Subsegment 2C. The beaches here are virtually nonexistent.

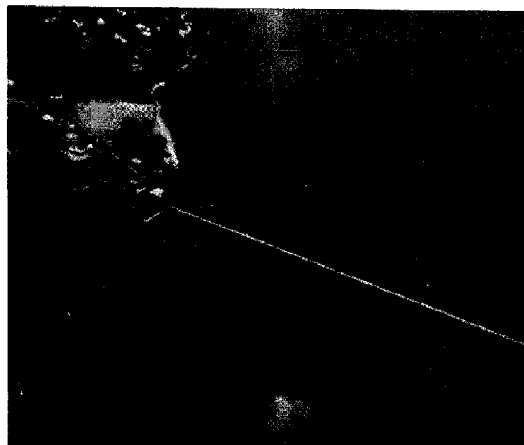


FIGURE 9

FIGURE 9: The Urbanna Creek jetty located in Subsegment 2C.



FIGURE 10

FIGURE 10: Parrotts Creek located in Subsegment 1B.



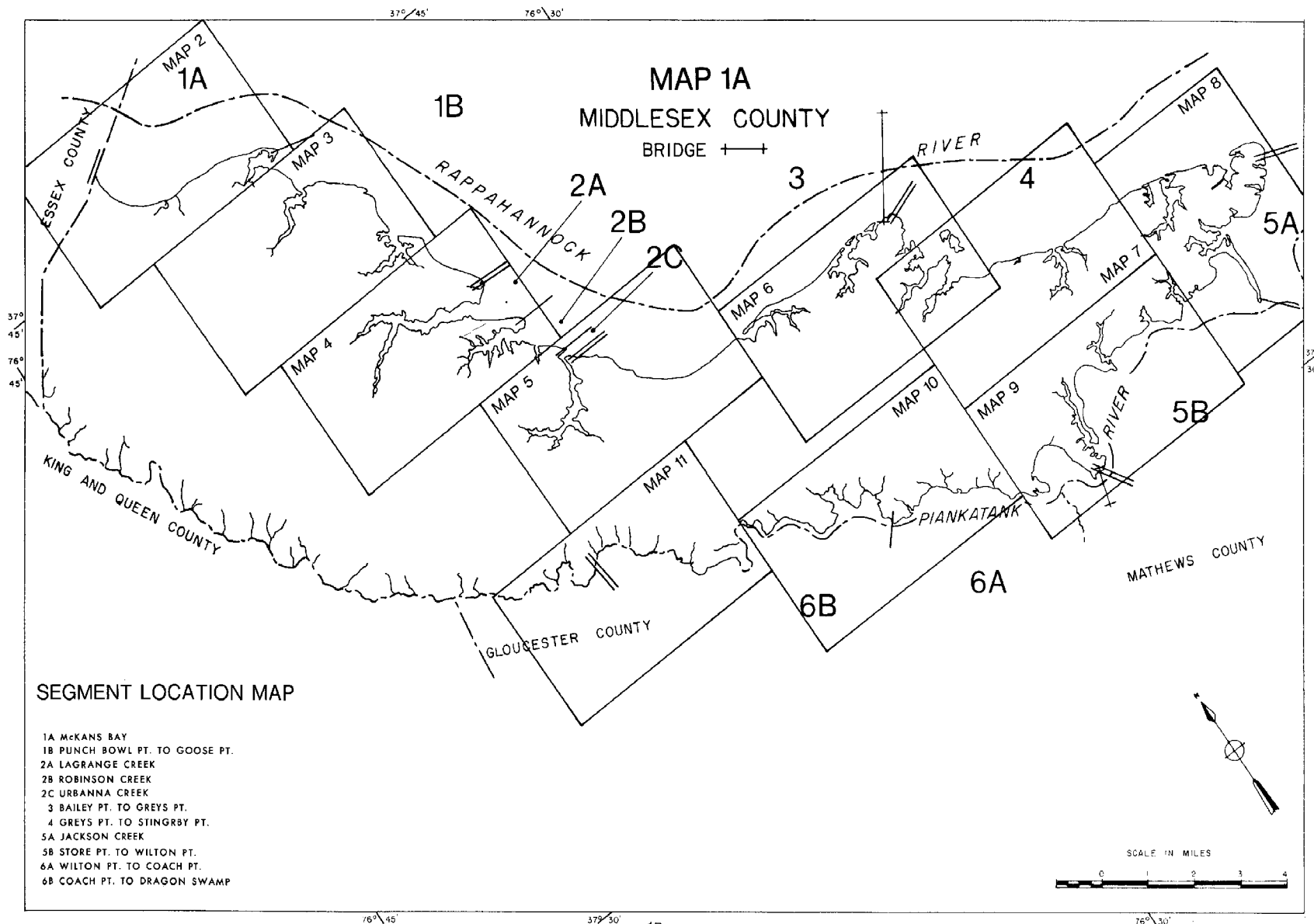
FIGURE 11

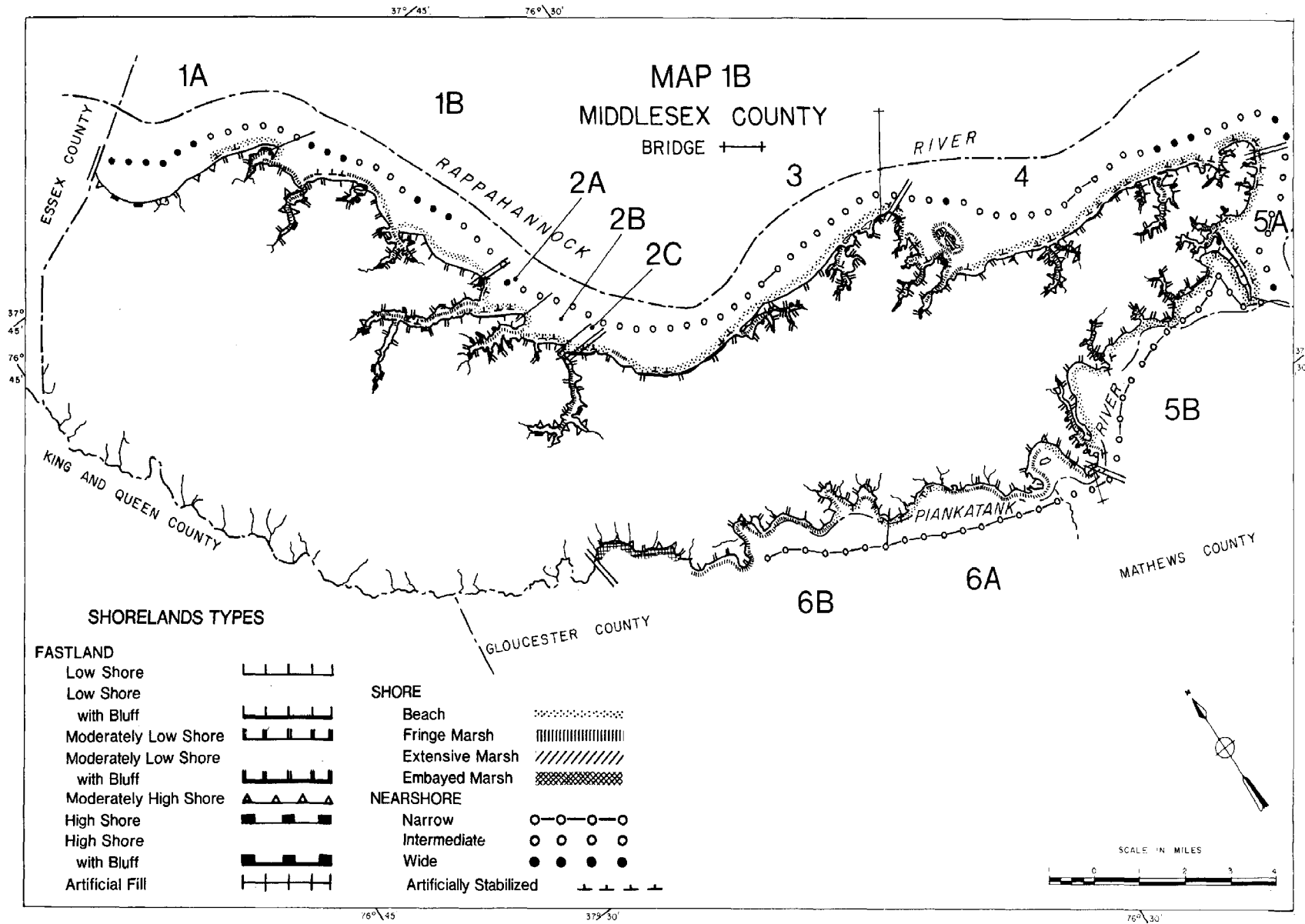
FIGURE 11: Parrotts Creek near Mill Stone Landing.

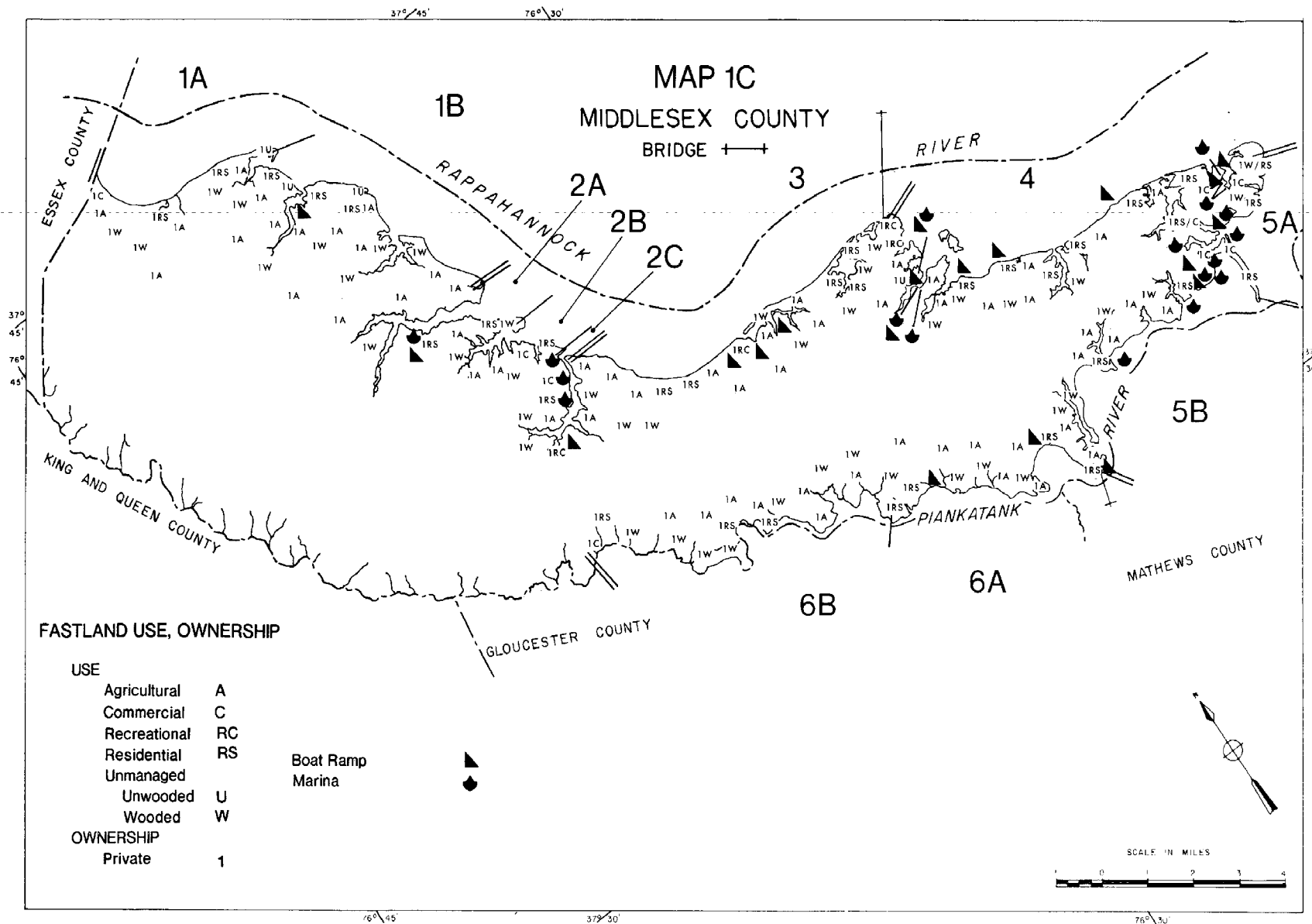


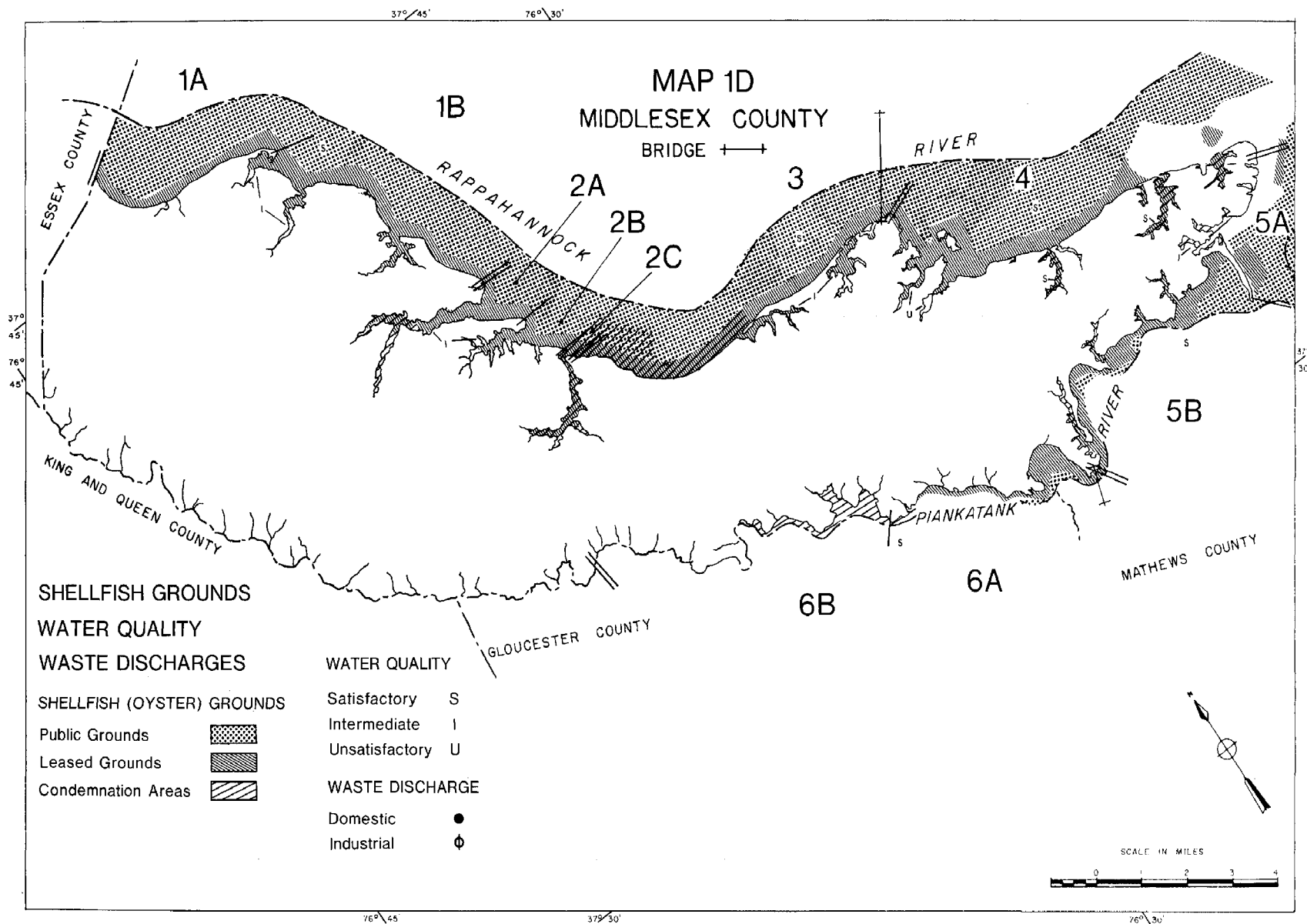
FIGURE 12

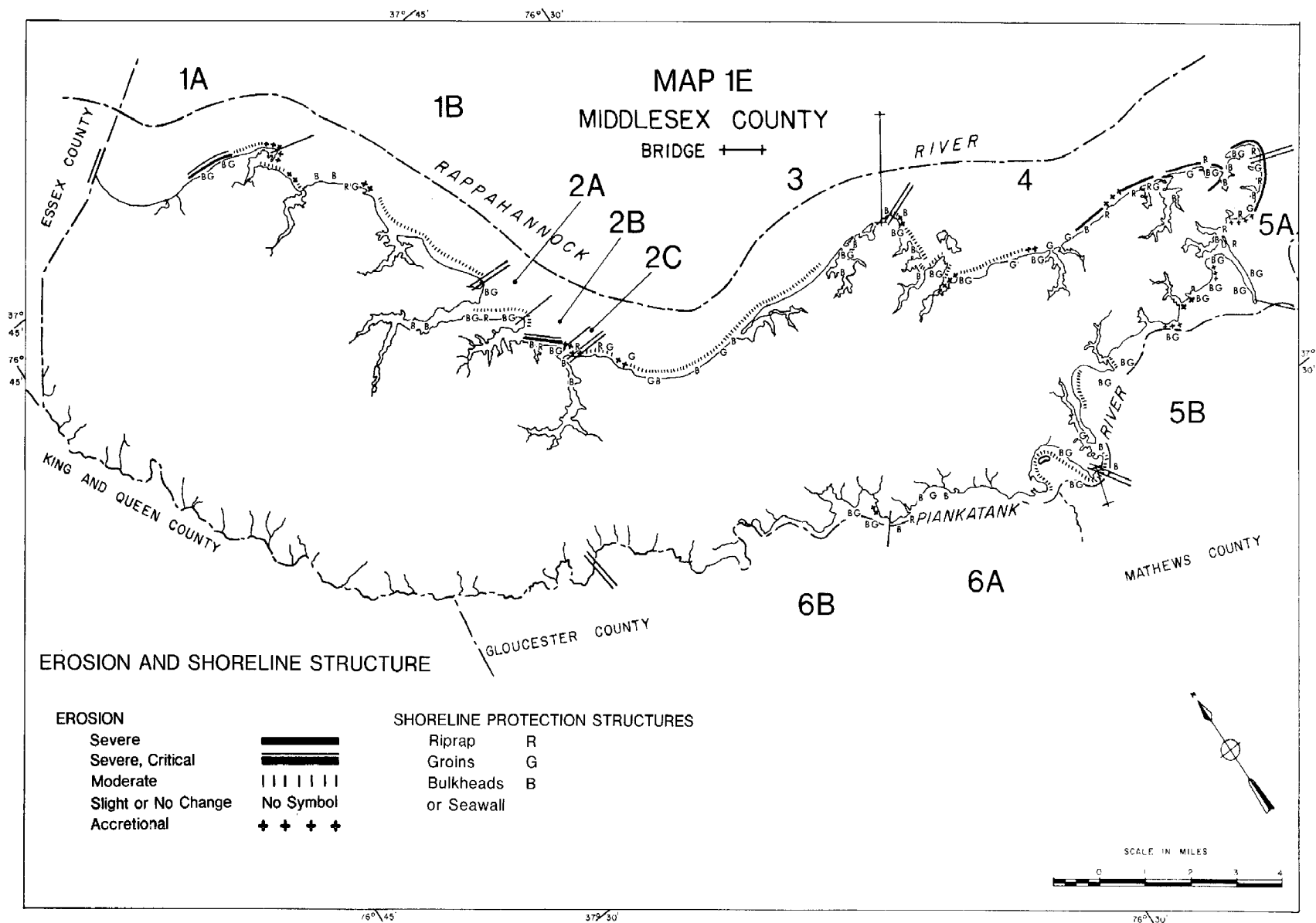
FIGURE 12: McKans Bay near the Middlesex - Essex county line. Note the slumping of the bluffs in the foreground.













CHAPTER 4

4.1 TABLE OF SUBSEGMENT SUMMARIES

4.2 SEGMENT AND SUBSEGMENT DESCRIPTIONS

4.3 SEGMENT AND SUBSEGMENT MAPS

TABLE 3 | SHORELINE SITUATION REPORT SUBSEGMENT SUMMARIES, MIDDLESEX COUNTY VIRGINIA

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION	POTENTIAL USE ENHANCEMENT
1A McKANE BAY 5.1 miles (fastland- 6.6 mi.)	PASTLAND: Low shore 14%, moderately low shore 48%, moderately high shore 11%, and high shore 27%. SHORE: Beach 69%, fringe marsh 14%, and artificially stabilized 17%. NEARSHORE: Intermediate 53% and wide 67%.	PASTLAND: Commercial 2%, residential 25%, unmanaged, wooded 61%, and unmanaged, unwooded 12%. SHORE: Bathing and private use, however most of the shoreline is unused. NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.	Private.	Low, noncritical for most of the segment; critical, for the shucking house near the county line.	No data.	Good. Beaches are wide, clean, and sandy.	Severe, noncritical from east of Bayport to Route 648; moderate, noncritical from Route 648 to Punchbowl Point. Punchbowl Point is accreting. All shore protective structures appear to be effective.	Low. Access to the shore is very limited.
1B PUNCHBOWL POINT TO GOOSE POINT 22.7 miles (fastland- 41.4 mi.)	PASTLAND: Low shore 24%, moderately low shore 59%, moderately high shore 9%, and high shore 15%. SHORE: Beach 21%, fringe marsh 60%, embayed marsh 18%, and artificially stabilized 1%. NEARSHORE: Narrow 66%, intermediate 17%, and wide 16%.	PASTLAND: Agricultural 22%, residential 18%, unmanaged, wooded 51%, and unmanaged, unwooded 9%. SHORE: Bathing and private use. NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.	Private.	Low, noncritical for most of the subsegment; moderate, critical in the vicinity of Water View.	Intermediate in Mud and Parrotte Creeks as of January, 1975.	Fair. Beaches are clean and sandy, but rather narrow.	Moderate, noncritical along the Rappahannock River, slight or no change within Mud, Parrotte, Harry George, and Weeks Creeks. Punchbowl Point and Smokey Point are accreting. All shore protective structures appear to be effective.	Low. Most of the property in this subsegment is being used for agricultural purposes.
2A LAGRANGE CREEK 14.8 miles (fastland- 20.6 mi.)	PASTLAND: Low shore 23%, moderately low shore 59%, moderately high shore 10%, and high shore 8%. SHORE: Beach 14%, fringe marsh 57%, embayed marsh 20%, and artificially stabilized 9%. NEARSHORE: Shallow 88%, intermediate 9%, and wide 3%.	PASTLAND: Agricultural 24%, commercial 1%, residential 7%, and unmanaged, wooded 68%. SHORE: Some bathing and fishing. NEARSHORE: Boating, water sports, and fishing.	Private.	Low, noncritical.	Unsatisfactory as of January, 1975.	Fair. Beaches along the mouth of LAGRANGE Creek are clean and sandy, but rather narrow.	Moderate, noncritical along Balls Point; slight or no change within the creek. All shore protective structures appear to be effective.	Moderate. Some residential development could be undertaken.
2B ROBINSON CREEK 11.4 miles (fastland- 13.0 mi.)	PASTLAND: Low shore 43%, moderately low shore 54%, and artificial fill 3%. SHORE: Beach 9%, fringe marsh 64%, embayed marsh 13%, and artificially stabilized 14%. NEARSHORE: Shallow 86% and intermediate 15%.	PASTLAND: Agricultural 18%, commercial 7%, residential 22%, and unmanaged, wooded 45%. SHORE: Bathing and private use. NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.	Private.	Low, noncritical, except critical near Remick Wharf and Urbanna Creek jetty.	Unsatisfactory as of January, 1975.	Fair to poor. Beaches along the mouth of Robinson Creek are clean and sandy, but narrow. Along the Rappahannock River beaches are exceedingly narrow and muddy.	Moderate to slight or no change in Robinson Creek. Severe along the Rappahannock River. Most of the protective structures are fairly effective. Along the Urbanna waterfront, some of the bulkheading needs repairing.	Moderate. Some development could take place along Robinson Creek.
2C URBANNA CREEK 5.9 miles (fastland- 10.6 mi.)	PASTLAND: Low shore 15%, moderately low shore 24%, moderately high shore 36%, high shore 15%, and artificial fill 4%. SHORE: Beach 9%, fringe marsh 67%, embayed marsh 19%, and artificially stabilized 5%. NEARSHORE: Shallow 95% and intermediate 5%.	PASTLAND: Agricultural 7%, commercial 6%, recreational 9%, residential 32%, and unmanaged, wooded 45%. SHORE: Bathing, private use, and commercial use. NEARSHORE: Boating, water sports, and fishing.	Private.	Low, noncritical, except critical near the Urbanna Creek jetty.	Condemned as of August 18, 1961.	Fair to poor. Most of the beaches are narrow and muddy. Near the creek's mouth there are some fairly wide, sandy beaches.	Slight or no change. Accretion is occurring around the Urbanna Creek jetty. All the shore protective structures are in good repair and are effective.	Moderate. Some developing could take place along the creek, but access to the shoreline is rather limited.
3 BAILEY POINT to GREYS POINT 24.6 miles (fastland- 24.5 mi.)	PASTLAND: Low shore 51% and moderately low shore 49%. SHORE: Beach 22%, fringe marsh 48%, extensive marsh 10%, and artificially stabilized 13%. NEARSHORE: Intermediate 100%.	PASTLAND: Agricultural 36%, recreational 6%, residential 13%, and unmanaged, wooded 45%. SHORE: Bathing and private use. NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.	Private.	Low, noncritical.	Intermediate in Whiting and Meachin Creeks as of January, 1975. The Rappahannock River below Urbanna Creek as far as Whiting Creek was condemned March 20, 1963.	Good. Beaches are clean, sandy, and wide.	Moderate, noncritical. All existing shore protective structures are effective. The bluffs on Greys Point and those east of Meachin Creek (off Route 645) may need some protection in the future.	Low. Most of the shoreline is presently being used for agricultural purposes.

Table 3 (continued)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION	POTENTIAL USE ENHANCEMENT
4 GREYS POINT to STINGRAY POINT 40.9 miles (fastland- 36.9 mi.)	PASTLAND: Low shore 46%, moderately low shore 38%, and moderately high shore 16%. SHORE: Beach 14%, fringe marsh 50%, embayed marsh 4%, extensive marsh 11%, and artificially stabilized 21%. NEARSHORE: Narrow 68%, intermediate 16%, and wide 16%.	PASTLAND: Agricultural 19%, commercial 9%, residential 38%, unmanaged, wooded 22%, and unmanaged, unwooded 11%. SHORE: Bathing, private use, and commercial use. NEARSHORE: Boating, water sports, waterfowl hunting, and commercial shellfishing.	Private.	Moderate, non-critical, except critical from Delteville to Stingray Point.	Intermediate in Locklies, Mill, Bush Park, and Sturgeon Creeks as of January, 1975. Satisfactory in Broad Creek as of January, 1975.	Good. Beaches are clean, sandy, and fairly wide.	Moderate, noncritical from Greys Point to Bush Park Creek. Severe, noncritical from east of Woods Creek to Stingray Point. Accretion is occurring southeast of Norris Bridge at the end of Route 631. All shore protective structures that are in good repair are effective.	Moderate. The shoreline in this subsegment is already fairly heavily developed. Delteville should be zoned to control the development of the coastal zone.
5A JACKSON CREEK 11.0 miles (fastland- 11.0 mi.)	PASTLAND: Low shore 100%. SHORE: Beach 9%, fringe marsh 46%, embayed marsh 6%, extensive marsh 4%, and artificially stabilized 33%. NEARSHORE: Narrow 71%, intermediate 27%, and wide 2%.	PASTLAND: Commercial 21%, residential 68%, and unmanaged, wooded 14%. SHORE: Bathing, private use, and commercial use. NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.	Private.	High, critical. Most of the structures are located on or below the 5-foot contour.	Satisfactory as of January, 1975.	Good to poor. Along the Rappahannock River, beaches are wide, clean, and sandy. In Jackson Creek, beaches are narrow and muddy.	Severe, noncritical from Stingray Point to the end of Route 680. Accretion is occurring east of the mouth of Jackson Creek. All shore protective structures in this subsegment appear to be effective.	Low. This area is already fairly heavily developed.
5B STOVE POINT to WILTON POINT 23.5 miles (fastland- 24.7 mi.)	PASTLAND: Low shore 34%, moderately low shore 58%, and artificial fill 8%. SHORE: Beach 24%, fringe marsh 45%, embayed marsh 5%, and artificially stabilized 23%. NEARSHORE: Narrow 93% and intermediate 7%.	PASTLAND: Agricultural 25%, commercial 9%, residential 16%, and unmanaged, wooded 50%. SHORE: Bathing, private use, and commercial use. NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.	Private.	Moderate, critical from Stove Point to Fishing Point; low, noncritical, from Fishing Point to Wilton Point.	Satisfactory as of January, 1975. Healy Creek was condemned April 28, 1972.	Good. Beaches are fairly wide, clean, and sandy.	Moderate, noncritical on Horse Point, Globe Neck, and Wilton Point. Fishing Point and Elard Point are accreting. All shore protective structures appear to be effective.	Moderate. More residential or second homes could be built in this area.
6A WILTON POINT to COACH POINT 9.7 miles (fastland- 10.2 mi.)	PASTLAND: Low shore 48%, moderately low shore 50%, and moderately high shore 2%. SHORE: Beach 19%, fringe marsh 54%, embayed marsh 9%, and artificially stabilized 18%. NEARSHORE: Narrow 64% and intermediate 36%.	PASTLAND: Agricultural 19%, residential 29%, and unmanaged, wooded 46%. SHORE: Bathing and private use. NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.	Private.	Low, noncritical for all of the subsegment, except critical for the Piankatank Shores development.	Satisfactory as of January, 1975.	Fair. The few beaches in this subsegment are clean and sandy, but very narrow.	Slight or no change to moderate. All shore protective structures appear to be effective.	Moderate. Some residential developing could be done.
6B COACH POINT to DRAGON SWAMP 13.3 miles (fastland- 13.6 mi.)	PASTLAND: Low shore 29%, moderately low shore 63%, moderately high shore 7%, and high shore 1%. SHORE: Beach 8%, fringe marsh 26%, embayed marsh 46%, extensive marsh 12%, and artificially stabilized 8%. NEARSHORE: Shallow 100%.	PASTLAND: Agricultural 18%, commercial 1%, residential 18%, and unmanaged, wooded 63%. SHORE: Some bathing and hunting. NEARSHORE: Boating, canoeing, water sports, fishing, and waterfowl hunting.	Private.	Low, noncritical for all of the subsegment, except critical for the Piankatank Shores development.	Intermediate as of January, 1975.	Poor. There are very few beaches in this subsegment. They are very narrow and composed of very fine sand to mud.	Slight or no change. Coach Point is accreting. All shore protective structures are effective except some bulkheading northwest of Coach Point along the Piankatank Shores development. This bulkhead is low and subject to washover during high tides.	Low. Much of this area is wetlands and should be left undisturbed.

McKANS BAY, MIDDLESEX COUNTY, VIRGINIA

SUBSEGMENT 1A (Map 2)

EXTENT: 27,000 feet (5.1 mi.) of shoreline from the Essex County line to Punchbowl Point on the Rappahannock River. The subsegment includes 35,000 feet (6.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 14% (0.9 mi.), moderately low shore 48% (3.2 mi.), moderately high shore 11% (0.7 mi.), and high shore 27% (1.8 mi.).
SHORE: Beach 69% (3.5 mi.), fringe marsh 14% (0.7 mi.), and artificially stabilized 17% (0.9 mi.).
NEARSHORE: Intermediate 33% (1.7 mi.) and wide 67% (3.4 mi.).

SHORELANDS USE

FASTLAND: Commercial 2% (0.2 mi.), residential 25% (1.7 mi.), unmanaged, wooded 61% (4.0 mi.), and unmanaged, unwooded 12% (0.7 mi.).
SHORE: Bathing and private use in populated areas, but most of the shore in this subsegment is unused.
NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.

OFFSHORE BOTTOM: The bottom consists of fine sand which grades into mud. It slopes gently to a channel which averages twenty feet in depth.

WIND AND SEA EXPOSURE: The shoreline trend from the county line to Bayport is N to S. The fetch from the NE is 2 to 3 nm, E is 4 to 5 nm, and SE is 1 to 2 nm. The shoreline trend from Bayport to Punchbowl Point is E to W. The fetch from the NW is 2½ to 11 nm, N is 3 nm, and NE is 2½ nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical. The majority of the structures are above the 20-foot contour. Critical for the shucking house near Butylo in Essex County.

WATER QUALITY: No data.

BEACH QUALITY: Good. The beaches are clean, composed of hard sand, and fairly wide.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Severe from just east of Bayport to the end of Route 648; moderate from the end of Route 648 to Punchbowl Point. Historically, the erosion rate in this subsegment has been 2.0 to 6.0 feet per year. Punchbowl Point is accreting at a rate of 1.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 2 bulkheads and 41 groins. Some of the groins off Route 648 are in a bad state of repair and not very effective. Those in good repair are effective.

Suggested Action: Repair and maintenance of all structures should be undertaken. The bank east of Bayport is being undercut and may need some protection.

OTHER SHORE STRUCTURES: There are 20 privately owned piers and several privately owned ramps.

POTENTIAL USE ENHANCEMENT: Low. Access to the shore in this area is limited.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MORATTICO Quadr., 1968.
USGS, 7.5 Min.Ser. (Topo.), CHURCH VIEW Quadr., 1968; Pr. 1973.
USGS, 7.5 Min.Ser. (Topo.), URBANNA Quadr., 1968.
C&GS, #605-SC, 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, 1971.

PHOTOS: Aerial-VIMS 21May75 MS-1A/537-560.

Ground-VIMS 14Jul75 MS-1A/81-84.

PUNCHBOWL POINT TO GOOSE POINT,

MIDDLESEX COUNTY, VIRGINIA

SUBSEGMENT 1B (Maps 2, 3, and 4)

EXTENT: 120,000 feet (22.7 mi.) of shoreline from Punchbowl Point to Goose Point on the Rappahannock River. This subsegment includes 218,800 feet (41.4 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 24% (10.0 mi.), moderately low shore 52% (21.6 mi.), moderately high shore 9% (3.5 mi.), and high shore 15% (6.2 mi.).
SHORE: Beach 21% (4.7 mi.), fringe marsh 60% (13.6 mi.), embayed marsh 18% (4.2 mi.), and artificially stabilized 1% (0.2 mi.).
NEARSHORE: Narrow 66% (12.2 mi.), intermediate 17% (3.2 mi.), and wide 16% (3.0 mi.).

SHORELANDS USE

FASTLAND: Agricultural 22% (9.1 mi.), residential 18% (7.3 mi.), unmanaged, wooded 51% (21.2 mi.), and unmanaged, unwooded 9% (3.9 mi.).
SHORE: Bathing and private use.
NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.

OFFSHORE BOTTOM: The bottom is composed of hard sand and slopes to a channel that averages twenty feet in depth.

WIND AND SEA EXPOSURE: The shoreline trend is SSE to NNW. The fetch from the NNE is 2½ to 3 nm, ENE is 2 nm, and ESE is 3 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical for most of the subsegment. Moderate, critical in the vicinity of Water View. Here, there are some structures located on and below the 5-foot contour.

WATER QUALITY: Intermediate in Mud Creek and Parrotts Creek as of January, 1975.

BEACH QUALITY: Fair. The beaches are clean and sandy although somewhat narrow.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Moderate, noncritical along the Rappahannock River. Slight or no change within Mud Creek, Parrotts Creek, Harry George Creek, and Weeks Creek. Historically, the erosion rate has been about 1.8 feet per year. Accretion is occurring on Punchbowl Point and Smokey Point at a rate of 0.7 to 1.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 3 bulkheads, 3 groins, and 1 section of riprap in this subsegment. All of these structures appear to be effective.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are 31 privately owned piers and a public landing on Parrotts Creek.

POTENTIAL USE ENHANCEMENT: Low. Most of the property in this subsegment is used for agricultural purposes.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHURCH VIEW
Quadr., 1968; Pr. 1973.
USGS, 7.5 Min.Ser. (Topo.), URBANNA
Quadr., 1968.
C&GS, #605-SC, 1:40,000 scale, RAPPAHANNOCK
RIVER, Corrotoman River to Fredericksburg,
1971.

PHOTOS: Aerial-VIMS 21May75 MS-1B/500-536.

Ground-VIMS 14Jul75 MS-1B/67-80.

LAGRANGE CREEK, MIDDLESEX COUNTY, VIRGINIA
SUBSEGMENT 2A (Map 4)

EXTENT: 78,000 feet (14.8 mi.) of shoreline on Lagrange Creek from Goose Point to Balls Point. The subsegment includes 108,600 feet (20.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 23% (4.7 mi.), moderately low shore 59% (12.1 mi.), moderately high shore 10% (2.0 mi.), and high shore 8% (1.8 mi.).
SHORE: Beach 14% (2.0 mi.), fringe marsh 57% (8.5 mi.), embayed marsh 20% (2.9 mi.), and artificially stabilized 9% (1.4 mi.).
NEARSHORE: Shallow 88% (9.7 mi.), intermediate 9% (0.9 mi.), and wide 3% (0.3 mi.). The bottom of the creek is muddy.

SHORELANDS USE

FASTLAND: Agricultural 24% (4.9 mi.), commercial 1% (0.2 mi.), residential 7% (1.5 mi.), and unmanaged, wooded 68% (14.0 mi.).
SHORE: Some bathing and fishing.
NEARSHORE: Boating, water sports, and fishing.

OFFSHORE BOTTOM: None.

WIND AND SEA EXPOSURE: The shoreline trend from Goose Point to Long Point is NE to SW. The fetch from the E is 2 nm, SE is 5 nm, and S is $\frac{1}{2}$ nm. From Cedar Point to Balls Point the shoreline trend is SE to NW. The fetch from the N is $\frac{1}{2}$ nm, NE is 3 nm, and E is 3 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical.

WATER QUALITY: Unsatisfactory as of January, 1975.

BEACH QUALITY: Fair. The beaches along the mouth of Lagrange Creek are clean and sandy, but somewhat narrow.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Moderate, noncritical along Balls Point and slight or no change in Lagrange Creek. Historically, the erosion rate in this subsegment has been about 0.7 feet per year.
ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 5 bulkheads, 23 groins, and 1 section of riprap. All structures appear to be effective.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are 39 piers in this subsegment.

POTENTIAL USE ENHANCEMENT: Moderate. If undertaken with care, there could be some residential development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), CHURCH VIEW Quadr., 1968, Pr. 1973.
USGS, 7.5 Min.Ser. (Topo.), URBANNA Quadr., 1968.
C&GS, #605-SC, 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, 1971.

PHOTOS: Aerial-VIMS 21May75 MS-2A/470-499.

ROBINSON CREEK, MIDDLESEX COUNTY, VIRGINIA
SUBSEGMENT 2B (Maps 4 and 5)

EXTENT: 60,000 feet (11.4 mi.) of shoreline on Robinson Creek from Balls Point to the Urbanna Creek jetty. This subsegment includes 68,600 feet (13.0 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 43% (5.6 mi.), moderately low shore 54% (7.0 mi.), and artificial fill 3% (0.4 mi.).
SHORE: Beach 9% (1.0 mi.), fringe marsh 64% (7.3 mi.), embayed marsh 13% (1.5 mi.), and artificially stabilized 14% (1.6 mi.).
NEARSHORE: Shallow 86% (6.5 mi.) and intermediate 15% (1.1 mi.).

SHORELANDS USE

FASTLAND: Agricultural 18% (2.4 mi.), commercial 7% (0.9 mi.), residential 22% (2.8 mi.), and unmanaged, wooded 45% (4.8 mi.).
SHORE: Bathing and private use.
NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.

OFFSHORE BOTTOM: In the Rappahannock River, the bottom is composed of hard sand and slopes gently to a channel that averages 30 feet in depth.

WIND AND SEA EXPOSURE: The shoreline trend along Balls Point is NE to SW. The fetch from the E is 2 nm, and from the SE is $3\frac{1}{2}$ nm. From Remlick Wharf to the Urbanna Creek jetty, the shoreline trend is SE to NW. The fetch from the N is 5 to 6 nm, NE is 2 nm, and E is 3 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low, critical near the Urbanna Creek jetty and Remlick Wharf where some structures are located below the 5-foot contour.

WATER QUALITY: Unsatisfactory as of January, 1975.

BEACH QUALITY: Fair to poor. Most of the beaches are narrow but are composed of hard, clean, sand. They are poor along the Urbanna waterfront. Here the beaches are exceedingly narrow.

and muddy.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Moderate along Balls Point, slight or no change in Robinson Creek, and severe along the Urbanna waterfront. Historically, the erosion rate has been 2.0 to 3.3 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: Remlick Wharf is bulkheaded. There is extensive bulkheading and riprap, and 17 groins along the Urbanna waterfront. Most of the groins are fairly effective. However, some of the bulkheading is in a bad state of repair and the banks in these areas are beginning to slump.

Suggested Action: Repair or replace the existing bulkheading.

OTHER SHORE STRUCTURES: There are 22 piers and the Urbanna Creek jetty.

POTENTIAL USE ENHANCEMENT: Moderate. The Urbanna area is already quite heavily developed, but some development could take place along Robinson Creek.

MAPS: USGS, 7.5 Min.Ser. (Topo.), URBANNA Quadr., 1968.
C&GS, #605-SC, 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, 1971.

PHOTOS: Aerial-VIMS 21May75 MS-2B/455-469.

Ground-VIMS 14Jul75 MS-2B/62-66.

URBANNA CREEK, MIDDLESEX COUNTY, VIRGINIA

SUBSEGMENT 2C (Map 5)

EXTENT: 50,000 feet (9.5 mi.) of shoreline on Urbanna Creek from the Urbanna Creek jetty to Bailey Point. This subsegment includes 56,000 feet (10.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 15% (1.6 mi.), moderately low shore 24% (2.5 mi.), moderately high shore 38% (4.0 mi.), high shore 19% (2.0 mi.), and artificial fill 4% (0.5 mi.).

SHORE: Beach 9% (0.8 mi.), fringe marsh 67% (6.4 mi.), embayed marsh 19% (1.8 mi.), and artificially stabilized 5% (0.5 mi.).

NEARSHORE: Shallow 95% (7.2 mi.) and intermediate 5% (0.4 mi.). The bottom of Urbanna Creek is muddy.

SHORELANDS USE

FASTLAND: Agricultural 7% (0.7 mi.), commercial 6% (0.6 mi.), recreational 9% (1.0 mi.), residential 32% (3.4 mi.), and unmanaged, wooded 45% (4.8 mi.).

SHORE: Some bathing, private use, and commercial use (marinas).

NEARSHORE: Boating, water sports, and fishing.

OFFSHORE BOTTOM: None.

WIND AND SEA EXPOSURE: None.

FLOOD HAZARD: Low, critical near the Urbanna Creek jetty where some structures are located lower than the 5-foot contour.

WATER QUALITY: Condemned as of August 18, 1961.

BEACH QUALITY: Fair to poor. Most of the beaches are narrow and muddy. However, there are a few fairly wide, clean, sandy beaches near the mouth of the creek.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change. Accretion is occurring around the Urbanna Creek jetty. Historically, this area has been accreting at a rate of 1.6 feet per year. Bailey Point has been eroding at a rate of 0.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: Extensive rip-rapping and bulkheading runs from the Urbanna Creek jetty to just northwest of the Route 227 bridge over Urbanna Creek. All bulkheading and riprap appears to be effective.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are 39 piers, a public landing, and 2 bridges in this subsegment.

POTENTIAL USE ENHANCEMENT: Moderate. Some developing could be done along Urbanna Creek, however access is rather limited to some areas of the shoreline.

MAPS: USGS, 7.5 Min.Ser. (Topo.), URBANNA Quadr., 1968.
USGS, 7.5 Min.Ser. (Topo.), SALUDA Quadr., 1965, Pr. 1973.
C&GS, #605-SC, 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, 1971.

PHOTOS: Aerial-VIMS 21May75 MS-2C/436-454.

Ground-VIMS 14Jul75 MS-2C/47-61.

BAILEY POINT TO GREYS POINT,
MIDDLESEX COUNTY, VIRGINIA
SEGMENT 3 (Maps 5 and 6)

EXTENT: 130,000 feet (24.6 mi.) of shoreline from Bailey Point to Greys Point on the Rappahannock River. This segment includes 129,600 feet (24.5 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 51% (12.4 mi.) and moderately low shore 49% (12.1 mi.).
SHORE: Beach 22% (5.4 mi.), fringe marsh 48% (11.7 mi.), embayed marsh 10% (1.8 mi.), extensive marsh 10% (2.5 mi.), and artificially stabilized 13% (3.2 mi.).
NEARSHORE: Intermediate 100% (8.2 mi.).

SHORELANDS USE

FASTLAND: Agricultural 36% (8.8 mi.), recreational 6% (1.4 mi.), residential 13% (3.3 mi.), and unmanaged, wooded 45% (11.0 mi.).
SHORE: Bathing and private use. A public beach is located in this segment, just west of Norris Bridge.
NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.

OFFSHORE BOTTOM: The bottom is composed of hard sand with some eel grass beds. It slopes to a channel averaging 20 feet in depth with some shoals.

WIND AND SEA EXPOSURE: The shoreline trend from Bailey Point to Burhans Wharf is SE to NW. The fetch from the N is 5 nm and from the NE is 2 nm. The shoreline trend from Burhans Wharf to Greys Point is E to W. The fetch from the NW is 2½ to 8 nm, N is 2 to 5½ nm, and NE is 2 to 3½ nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical. All structures are located above the 10-foot contour.

WATER QUALITY: Intermediate in Whiting and Meachim Creeks as of January, 1975. The Rappahannock River below Urbanna Creek as far as Whiting Creek was condemned for shellfishing as of March 20, 1963 (continued condemned,

March 21, 1972).

BEACH QUALITY: Good. The beaches are fairly wide and composed of hard, clean sand.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate, noncritical. Historically, this segment has been eroding at a rate of 1.0 to 2.0 feet per year. There is accretion occurring southeast of Rosegill Lake at a rate of 1.0 to 1.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 8 bulkheads, 93 groins, and a section of riprap. All existing structures are effective.

Suggested Action: The bluffs on Greys Point and those east of Meachim Creek (off Route 645) are slumping badly and need some protection.

OTHER SHORE STRUCTURES: There are 58 piers, a public landing, and Norris Bridge, which joins Middlesex and Lancaster Counties.

POTENTIAL USE ENHANCEMENT: Low. Most of the shoreline in this segment is already been used for agricultural purposes.

MAPS: USGS, 7.5 Min.Ser. (Topo.), URBANNA

Quadr., 1968.

USGS, 7.5 Min.Ser. (Topo.), SALUDA Quadr., 1965, Pr. 1973.

USGS, 7.5 Min.Ser. (Topo.), WILTON Quadr., 1964, Pr. 1973.

C&GS, #605-SG, 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, 1971.

C&GS, #534-SG, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank and Great Wicomico Rivers, 1973.

PHOTOS: Aerial-VIMS 21May75 MS-3/373-435.

Ground-VIMS 1Jul75 MS-3/34-38;
22Oct73 MS-3/39-46.

GREYS POINT TO STINGRAY POINT,
MIDDLESEX COUNTY, VIRGINIA
SEGMENT 4 (Maps 6, 7, and 8)

EXTENT: 216,000 feet (40.9 mi.) of shoreline from Greys Point to Stingray Point on the Rappahannock River. This segment includes 195,000 feet (36.9 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 46% (16.9 mi.), moderately low shore 38% (14.2 mi.), and moderately high shore 16% (5.8 mi.).
SHORE: Beach 14% (5.9 mi.), fringe marsh 50% (20.2 mi.), embayed marsh 4% (1.5 mi.), extensive marsh 11% (4.6 mi.), and artificially stabilized 21% (8.7 mi.).
NEARSHORE: Narrow 68% (23.1 mi.), intermediate 16% (5.5 mi.), and wide 16% (5.3 mi.).

SHORELANDS USE

FASTLAND: Agricultural 19% (7.1 mi.), commercial 9% (3.3 mi.), residential 38% (14.1 mi.), unmanaged, wooded 22% (8.3 mi.), and unmanaged, unwooded 11% (4.1 mi.).
SHORE: Bathing, private use, and commercial use (marinas).
NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.

OFFSHORE BOTTOM: The bottom is composed of hard sand and slopes to a channel that averages 50 feet in depth. There are some oyster rocks in the vicinity of Greys Point and a spoil dump off the Parrott Islands.

WIND AND SEA EXPOSURE: The shoreline trend, from Greys Point to Mill Creek is SSE to NNW. The fetch from the NNE is $1\frac{1}{2}$ to $2\frac{1}{2}$ nm, from the ENE is $2\frac{1}{2}$ to $3\frac{1}{2}$ nm, from the ESE is 2 to 5 nm, and 27 nm at Greys Point. The shoreline trend from Mill Creek to Stingray Point is ESE to WNW. The fetch from the NNW is $2\frac{1}{2}$ to $4\frac{1}{2}$ nm, from the NNE is 3 nm, 3 nm at Stingray Point, from the ENE is 6 nm to Bush Park Creek, and 25 to 30 nm beyond the creek.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate, critical from Deltaville to Stingray Point.

WATER QUALITY: Intermediate in Locklies and Mill Creeks as of January, 1975. Intermediate in Bush Park Creek and Sturgeon Creek as of January, 1975. Satisfactory in Broad Creek as of January, 1975.

BEACH QUALITY: Good. The beaches are fairly wide and composed of hard, clean sand.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Moderate, noncritical from Greys Point to Bush Park Creek. Severe, noncritical from east of Woods Creek to Stingray Point. Historically, the erosion rate has been 1.0 to 3.0 feet per year in this area. Accretion is occurring just southeast of Norris Bridge and at the end of Route 631 at a rate of 1.0 to 1.5 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 25 bulkheads, 189 groins, and 7 sections of riprap. All the structures that are in good repair are effective. Some of the groins east of Sturgeon Creek are in bad repair and are, therefore, ineffective.

Suggested Action: Repair the existing groins which are deteriorating.

OTHER SHORE STRUCTURES: There are 194 piers, several public landings, 2 private landings, and breakwaters which are located at the mouths of Bush Park Creek, Woods Creek, Hunting Creek, Sturgeon Creek, and Broad Creek.

POTENTIAL USE ENHANCEMENT: Moderate. Deltaville should be zoned so as to control and contain the development of the coastal zone.

MAPS: USGS, 7.5 Min.Ser. (Topo.), WILTON Quadr., 1964, Pr. 1973.
USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964.
C&GS, #534-SC, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank and Great Wicomico Rivers, 1973.

PHOTOS: Aerial-VIMS 21May75 MS-4/260-372.

Ground-VIMS 1Jul75 MS-4/26-35.

JACKSON CREEK, MIDDLESEX COUNTY, VIRGINIA

SUBSEGMENT 5A (Map 8)

EXTENT: 58,000 feet (11.0 mi.) of shoreline from Stingray Point to Stove Point on the Piankatank River. This subsegment includes 58,000 feet (11.0 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: This subsegment is 100% low shore (11.0 mi.).

SHORE: Beach 9% (1.0 mi.), fringe marsh 46% (5.1 mi.), embayed marsh 8% (0.9 mi.), extensive marsh 4% (0.4 mi.), and artificially stabilized 33% (3.6 mi.).

NEARSHORE: Narrow 71% (6.0 mi.), intermediate 27% (2.3 mi.), and wide 2% (0.2 mi.).

SHORELANDS USE

FASTLAND: Commercial 21% (2.4 mi.), residential 65% (7.1 mi.), and unmanaged, wooded 14% (1.5 mi.).

SHORE: Bathing, private use, and commercial use (marinas).

NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.

OFFSHORE BOTTOM: The bottom is hard and sandy with eel grass beds. It slopes to a wide channel that averages 20 feet in depth.

WIND AND SEA EXPOSURE: The shoreline trend from Stingray Point to Jackson Creek is NE to SW. The fetch from the E is 1.9 nm, from the SE is 22 nm, and from the S is $2\frac{1}{2}$ to $3\frac{1}{2}$ nm. The shoreline trend from Jackson Creek to Stove Point is N to S. The fetch from the NE is 44 nm, E is 20 nm, and SE is 2 nm.

OWNERSHIP: Private.

FLOOD HAZARD: High, critical. Most of the structures in this subsegment are located on or below the 5-foot contour.

WATER QUALITY: Satisfactory as of January, 1975.

BEACH QUALITY: Good to poor. Along the Rappahannock River the beaches are fairly wide and composed of clean, hard sand. In Jackson Creek the beaches are narrow and muddy.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Severe from Stingray Point to the end of Route 680. Historically, Stingray Point is eroding at a rate of 6.1 feet per year. East of the mouth of Jackson Creek accretion is occurring at a rate of 2.4 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 15 bulkheads, 98 groins, and 7 sections of rip-rap. All of these structures appear to be effective.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are 108 piers, 3 breakwaters, and a seawall enclosing a swimming area which is located southwest of Stingray Point.

POTENTIAL USE ENHANCEMENT: Low. This area is already fairly heavily developed.

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964.

C&GS, #534-SC, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank and Great Wicomico Rivers, 1973.

PHOTOS: Aerial-VIMS 21May75 ME-5A/195-259.

Ground-VIMS 1Jul77 MS-5A/17-25.

STOVE POINT TO WILTON POINT,

MIDDLESEX COUNTY, VIRGINIA

SUBSEGMENT 5B (Maps 8 and 9)

EXTENT: 124,000 feet (23.5 mi.) of shoreline from Stove Point to Wilton Point on the Piankatank River. The subsegment includes 130,400 feet (24.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 34% (8.3 mi.), moderately low shore 58% (14.5 mi.), and artificial fill 8% (1.9 mi.).

SHORE: Beach 24% (5.7 mi.), fringe marsh 45% (10.5 mi.), embayed marsh 8% (1.8 mi.), and artificially stabilized 23% (5.5 mi.).

NEARSHORE: Narrow 93% (19.4 mi.) and intermediate 7% (1.4 mi.).

SHORELANDS USE

FASTLAND: Agricultural 25% (6.1 mi.), commercial 9% (2.1 mi.), residential 16% (4.0 mi.), and unmanaged, wooded 50% (12.5 mi.).

SHORE: Bathing, private use, and commercial use (marinas).

NEARSHORE: Boating, water sports, fishing, and commercial shellfishing.

OFFSHORE BOTTOM: The bottom is composed of hard sand. It slopes to a wide channel which averages 20 feet in depth.

WIND AND SEA EXPOSURE: The shoreline trend of Stove Point Neck is N to S. The fetch from the SW is $1\frac{1}{2}$ nm, from the W is $1\frac{1}{2}$ to $3\frac{1}{2}$ nm, and from the NW is $\frac{1}{2}$ to 1 nm. The shoreline trend from Fishing Point to Horse Point is E to W. The fetch from the SE is 1 to 3 nm, from the S is $\frac{1}{2}$ to 2 nm, and from the SW is 1 nm. The shoreline trend of Glebe Neck is NNE to SSW. The fetch from the ENE is $\frac{1}{2}$ to 1 nm, from the ESE is $\frac{1}{2}$ to 1 nm, and from the SSE is $\frac{1}{2}$ nm.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate, critical, from Stove Point to Fishing Point. Low, noncritical, from Fishing Point to Wilton Point.

WATER QUALITY: Satisfactory as of January, 1975.
Healy Creek was condemned as of April 28, 1972.

BEACH QUALITY: Good. The beaches are clean,
sandy, and fairly wide.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Moderate, noncritical on Horse
Point, Glebe Neck, and Wilton Point. Histori-
cally, the erosion rate has been 1.0 to 2.0
feet per year. Fishing Point and Bland Point
are accreting at an historical rate of 0.7 to
1.0 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 18
bulkheads, 101 groins, and 3 sections of rip-
rap. All of these structures appear to be
effective.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are 93 piers and
2 breakwaters in this subsegment.

POTENTIAL USE ENHANCEMENT: Moderate. More res-
idential or second homes could be built in
this area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE
Quadr., 1964.
USGS, 7.5 Min.Ser. (Topo.), WILTON
Quadr., 1964, Pr. 1973.
C&GS, #534-SC, 1:40,000 scale, RAPPAHANNOCK
RIVER ENTRANCE, Piankatank and Great
Wicomico Rivers, 1973.

PHOTOS: Aerial-VIMS 21May75 MS-5B/85-194.

Ground-VIMS 1Jul75 MS-5B/10-16.

WILTON POINT TO COACH POINT,
MIDDLESEX COUNTY, VIRGINIA
SUBSEGMENT 6A (Maps 9 and 10)

EXTENT: 51,000 feet (9.7 mi.) of shoreline from Wilton Point to Coach Point on the Piankatank River. This subsegment includes 54,000 feet (10.2 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 48% (4.9 mi.), moderately low shore 50% (5.1 mi.), and moderately high shore 2% (0.2 mi.).
SHORE: Beach 19% (1.8 mi.), fringe marsh 54% (5.3 mi.), embayed marsh 9% (0.9 mi.), and artificially stabilized 18% (1.7 mi.).
NEARSHORE: Narrow 64% (5.6 mi.) and intermediate 36% (3.1 mi.). The bottom is muddy and the narrow channel averages 5 feet in depth.

SHORELANDS USE

FASTLAND: Agricultural 19% (1.9 mi.), residential 29% (3.0 mi.), and unmanaged, wooded 46% (4.7 mi.).
SHORE: Bathing and private use.
NEARSHORE: Boating, water sports, fishing, waterfowl hunting, and commercial shellfishing.

OFFSHORE BOTTOM: None.

WIND AND SEA EXPOSURE: The fetch is limited to $\frac{1}{2}$ to 1 nm in each direction.

OWNERSHIP: Private.

FLOOD HAZARD: Low, critical at the Piankatank Shores development.

WATER QUALITY: Satisfactory as of January, 1975.

BEACH QUALITY: Fair. The few beaches in this subsegment are very narrow but clean and sandy.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Moderate from Wilton Point to Doctor Point and slight or no change from Doctor Point to Coach Point. The historical rate of erosion from Wilton Point to Doctor Point has been 1.0 to 1.3 feet per year and from Doctor Point to Coach Point, 0.7 feet per year.

ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are 11 bulkheads, 13 groins, and 1 section of riprap. All these structures appear to be effective.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are 39 piers and the Twigg Bridge which joins Middlesex and Mathews Counties.

POTENTIAL USE ENHANCEMENT: Moderate. Some of this subsegment could be used for residential development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), WILTON
Quadr., 1964, Pr. 1973.
O&GS, #534-SC, 1:40,000 scale, RAPPAHANNOCK
RIVER ENTRANCE, Piankatank and Great
Wicomico Rivers, 1973.

PHOTOS: Aerial-VIMS 21May75 MS-6A/35-84.

Ground-VIMS 1Jul75 MS-6A/7-9.

COACH POINT TO DRAGON SWAMP,
MIDDLESEX COUNTY, VIRGINIA
SUBSEGMENT 6B (Maps 10 and 11)

EXTENT: 70,000 feet (13.3 mi.) of shoreline from Coach Point on the Piankatank River to the Route 17 bridge over Dragon Swamp. This subsegment includes 72,000 feet (13.6 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 29% (4.0 mi.), moderately low shore 63% (8.4 mi.), moderately high shore 7% (1.0 mi.), and high shore 1% (0.2 mi.).
SHORE: Beach 8% (1.0 mi.), fringe marsh 26% (3.5 mi.), embayed marsh 46% (6.2 mi.), extensive marsh 12% (1.6 mi.), and artificially stabilized 8% (1.0 mi.).
NEARSHORE: The nearshore in this subsegment is 100% shallow (2.7 mi.). The bottom is muddy and there is no marked channel.

SHORELANDS USE

FASTLAND: Agricultural 18% (2.4 mi.), commercial 1% (0.2 mi.), residential 18% (2.5 mi.), and unmanaged, wooded 63% (8.5 mi.).
SHORE: Some bathing and hunting.
NEARSHORE: Boating, canoeing, water sports, fishing, and waterfowl hunting.

OFFSHORE BOTTOM: None.

WIND AND SEA EXPOSURE: The fetch is limited to $\frac{1}{2}$ to 1 nm in each direction.

OWNERSHIP: Private.

FLOOD HAZARD: Low, critical at the Piankatank Shores development on Coach Point.

WATER QUALITY: Intermediate as of January, 1975.

BEACH QUALITY: Poor. The few beaches in this subsegment are located near Coach Point. These are very narrow and composed of very fine sand to mud.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change. Coach Point has been accreting at a rate of 0.8 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are 7 bulkheads and 5 groins. The low bulkheading northwest of Coach Point in the Piankatank Shores development is subject to washover during high tides.

Suggested Action: None at the present time. It may be necessary at some time to replace the bulkheading that is located northwest of Coach Point in the Piankatank Shores development.

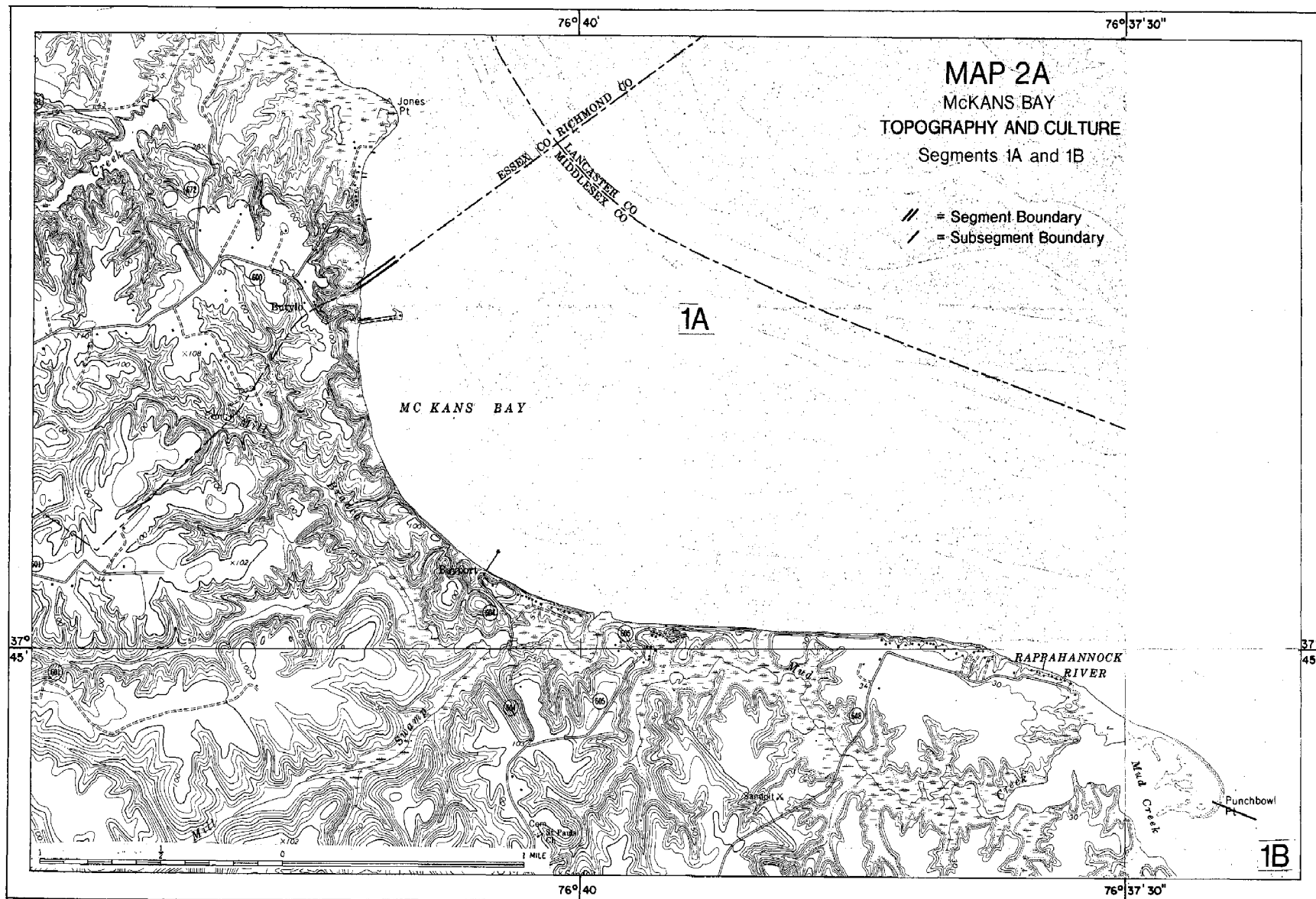
OTHER SHORE STRUCTURES: There are 57 piers in this subsegment.

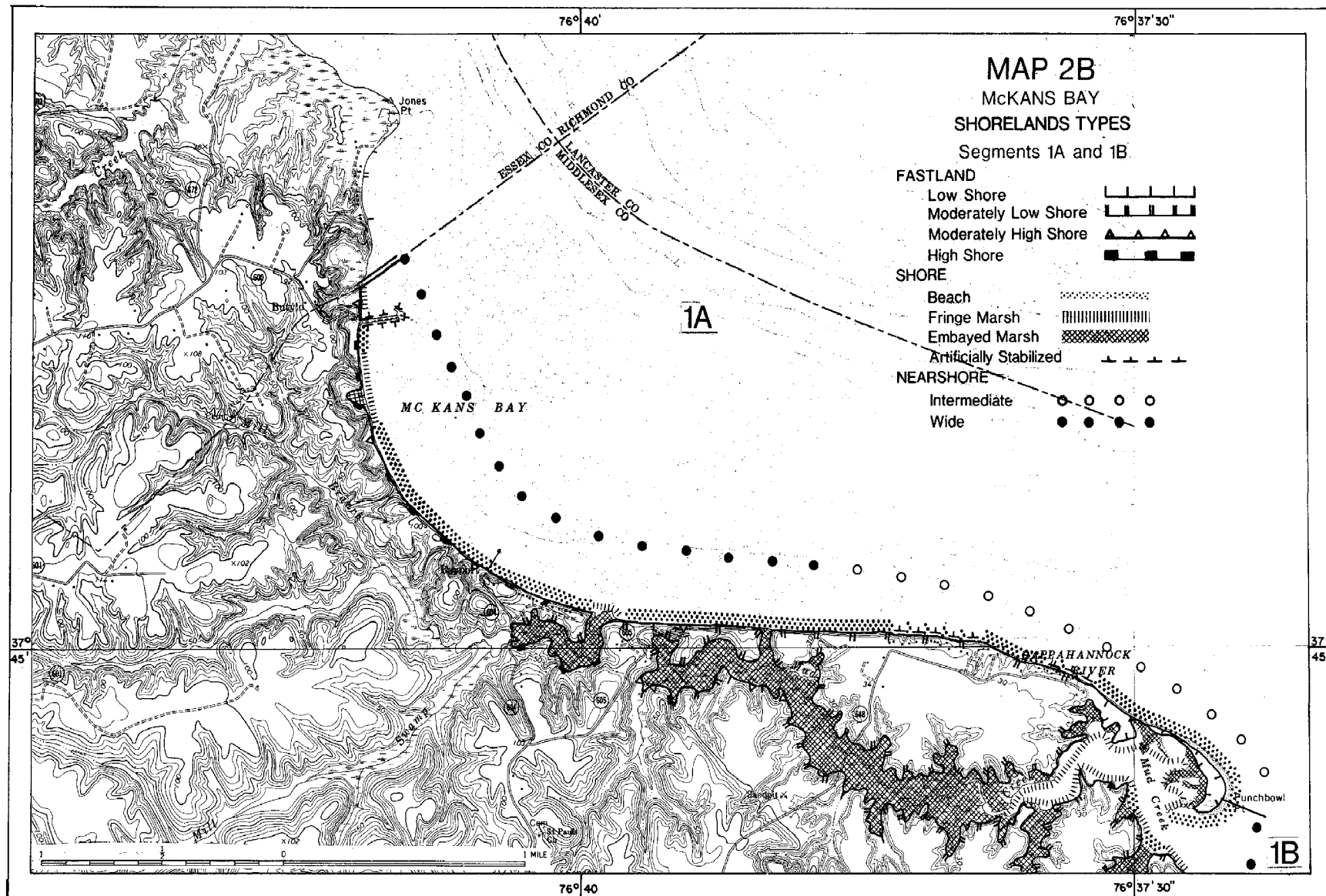
POTENTIAL USE ENHANCEMENT: Low. Much of this subsegment is wetlands and should be left undisturbed. Some nature tours could be taken through Dragon Swamp which is still a relatively unspoiled area.

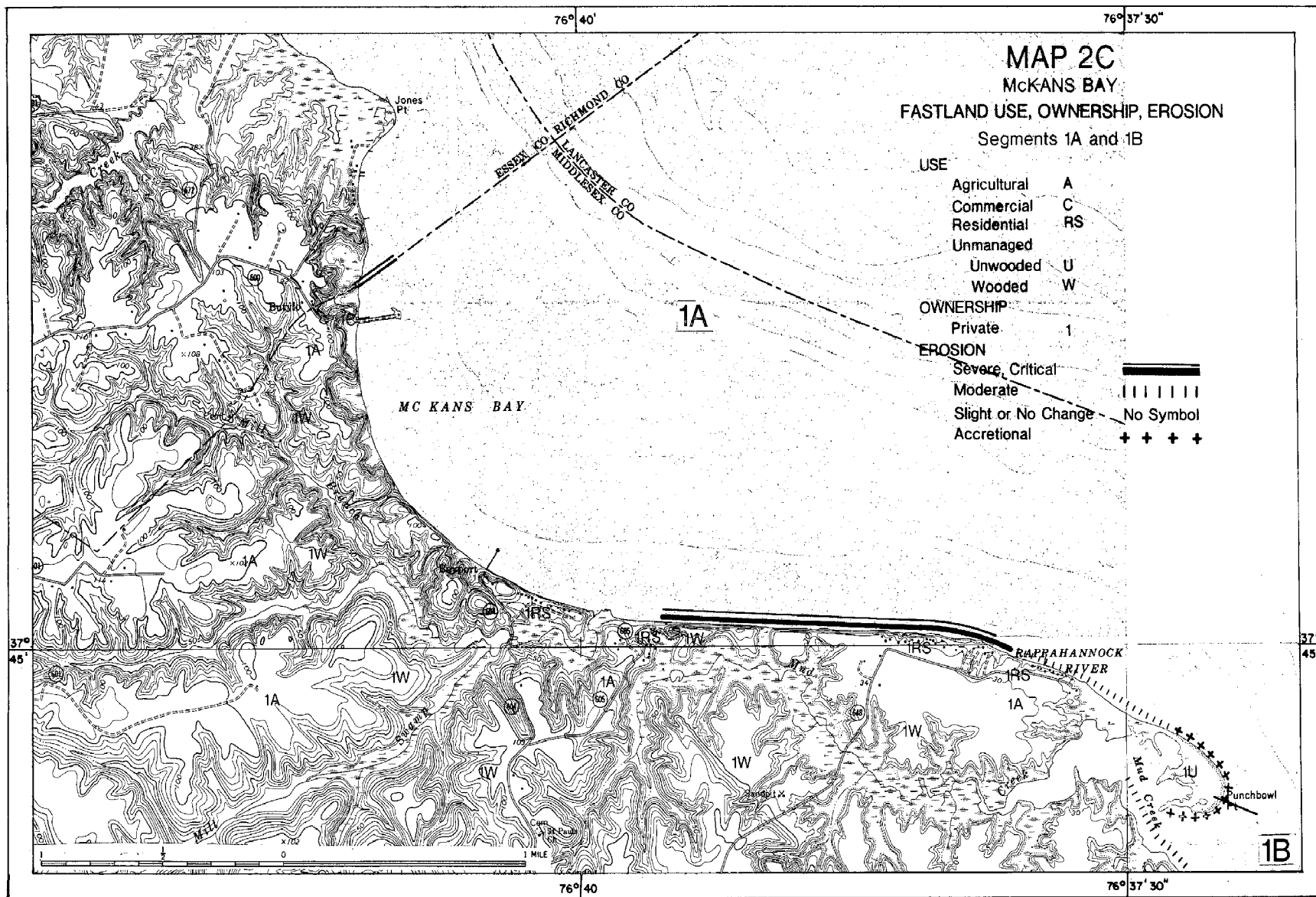
MAPS: USGS, 7.5 Min.Ser. (Topo.), WILTON
Quadr., 1964, Pr. 1973.
USGS, 7.5 Min.Ser. (Topo.), SALUDA
Quadr., 1965, Pr. 1973.
USGS, 7.5 Min.Ser. (Topo.), SHACKLEFORDS
Quadr., 1965.
C&GS, #534-SC, 1:40,000 scale, RAPPAHANNOCK
RIVER ENTRANCE, Piankatank and Great
Wicomico Rivers, 1973.

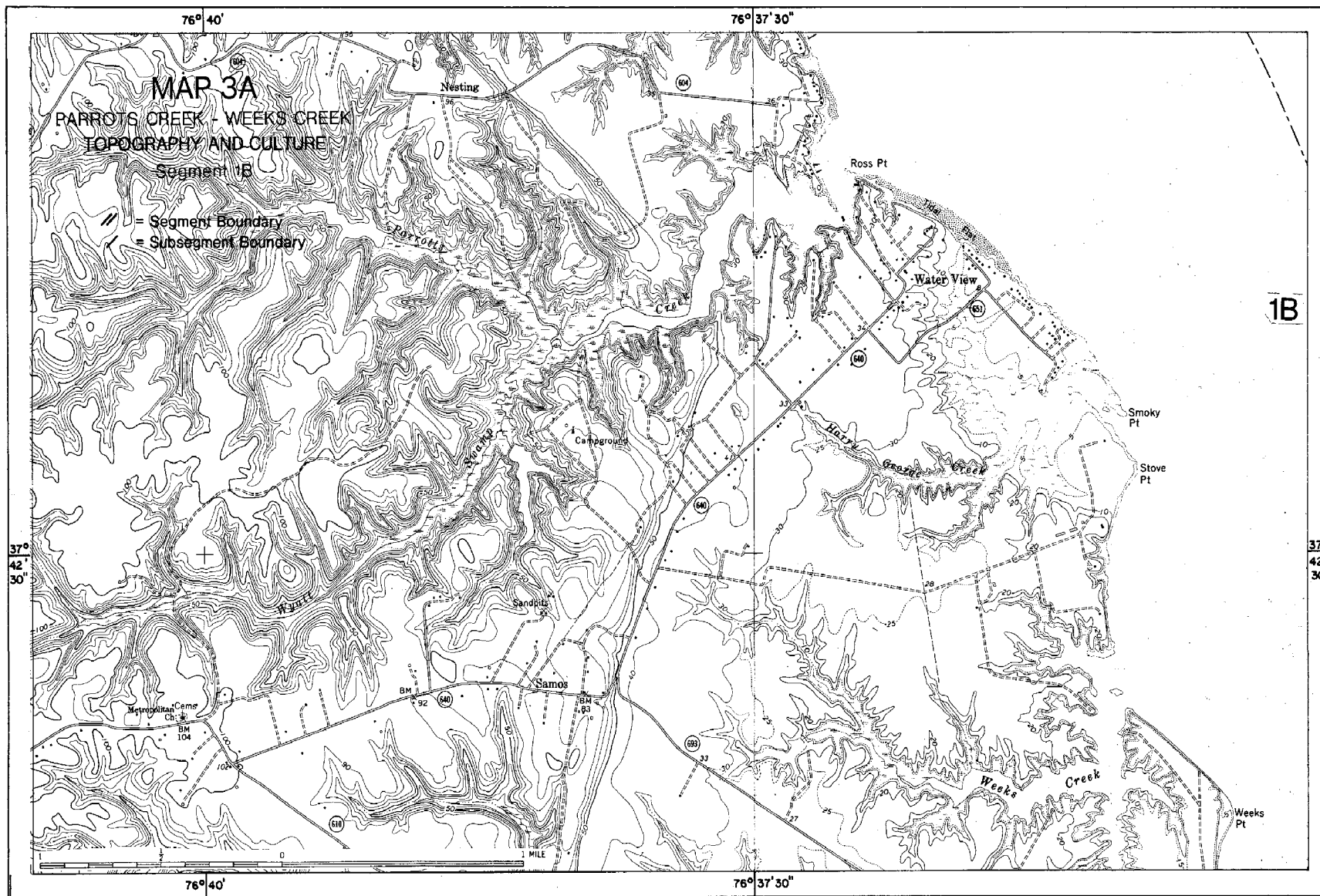
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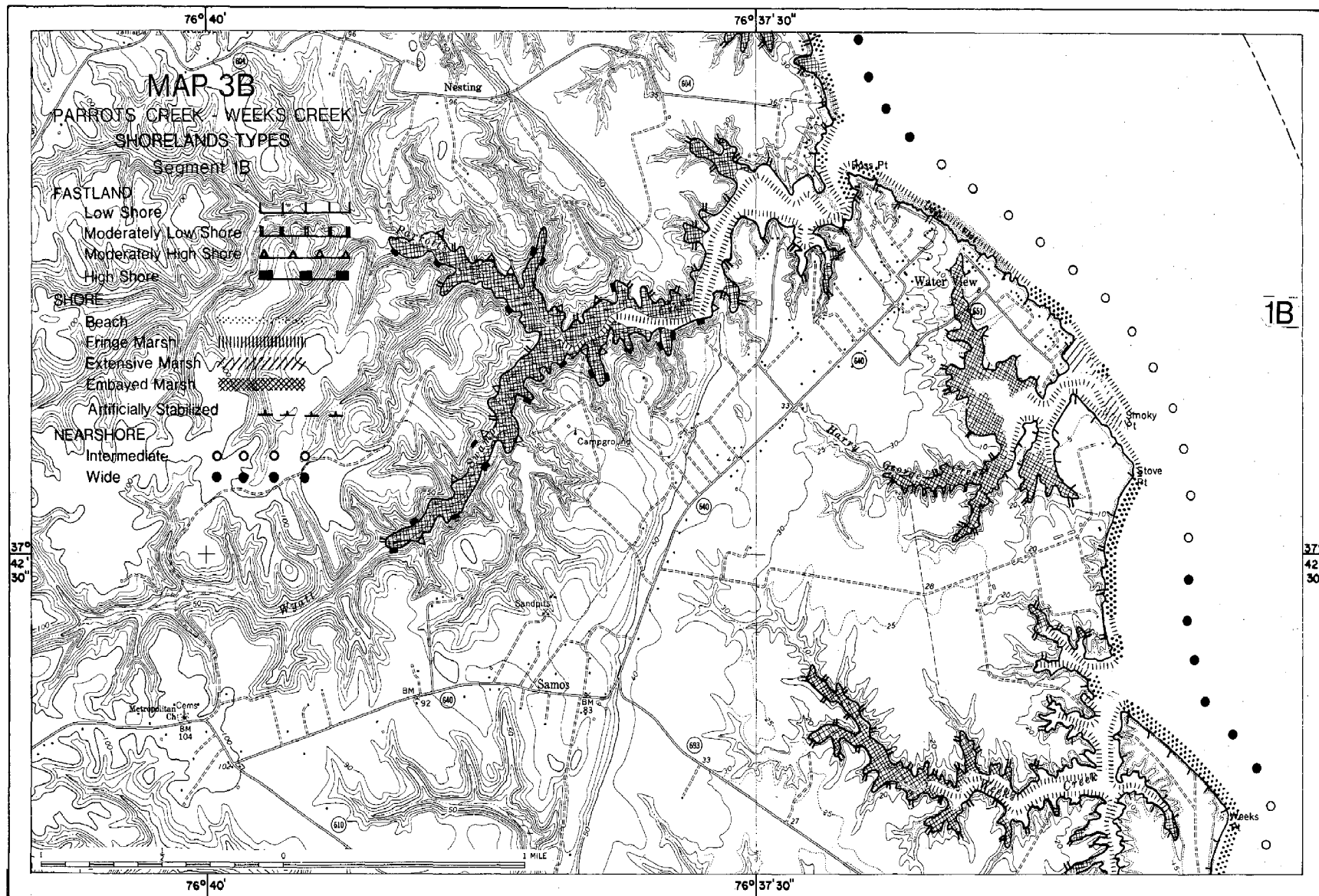
Ground-VIMS 1Jul75 MS-6B/1-8.

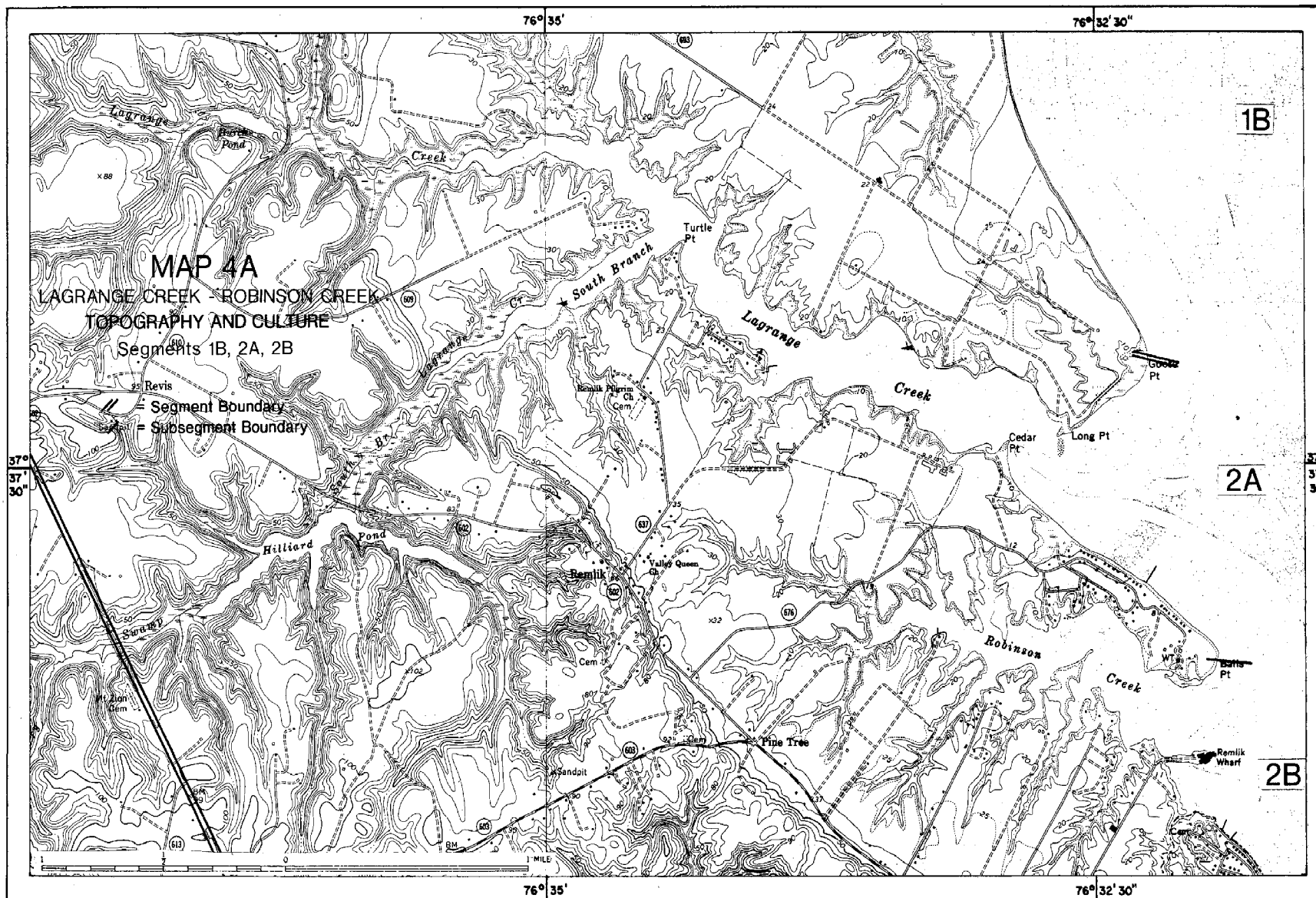


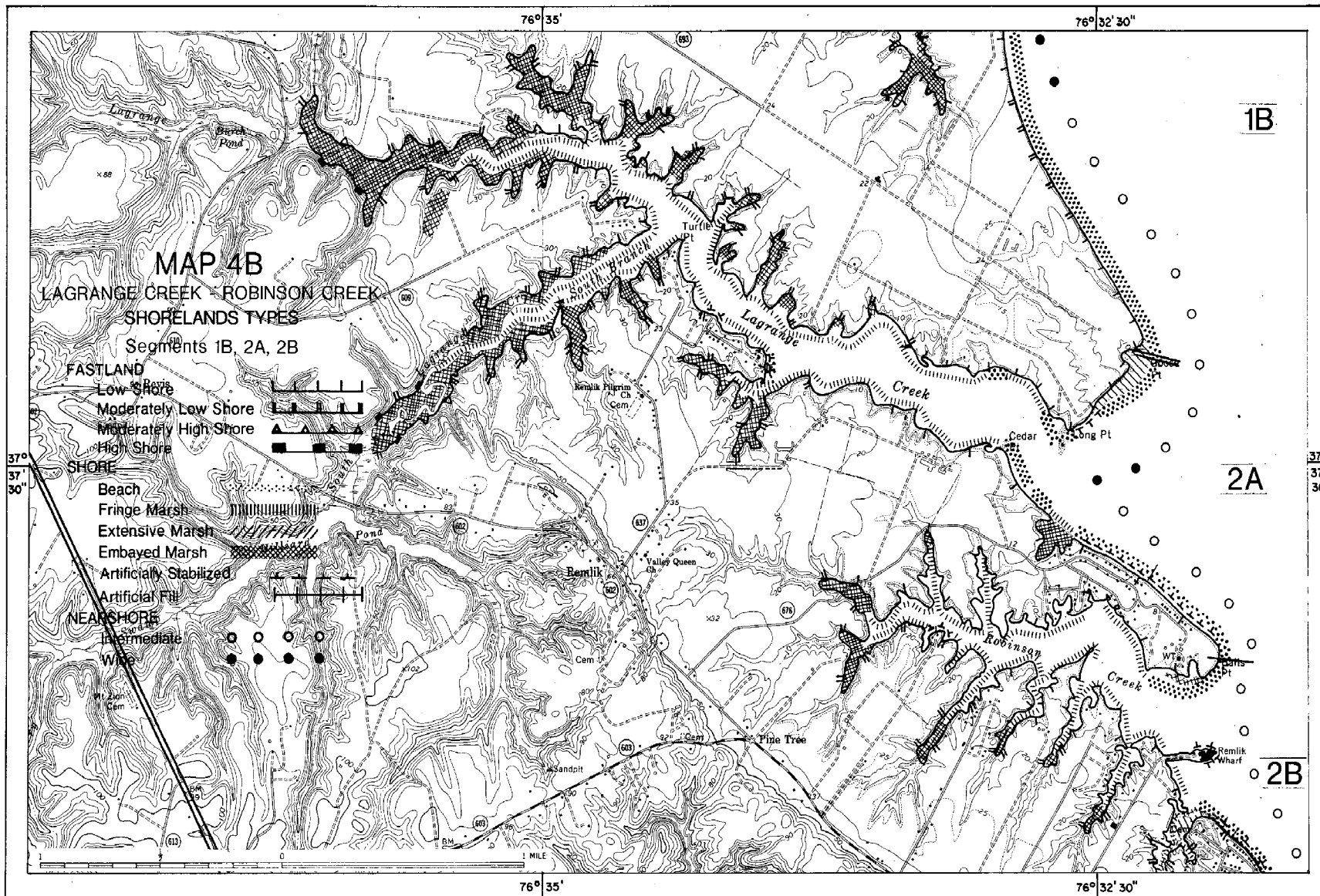


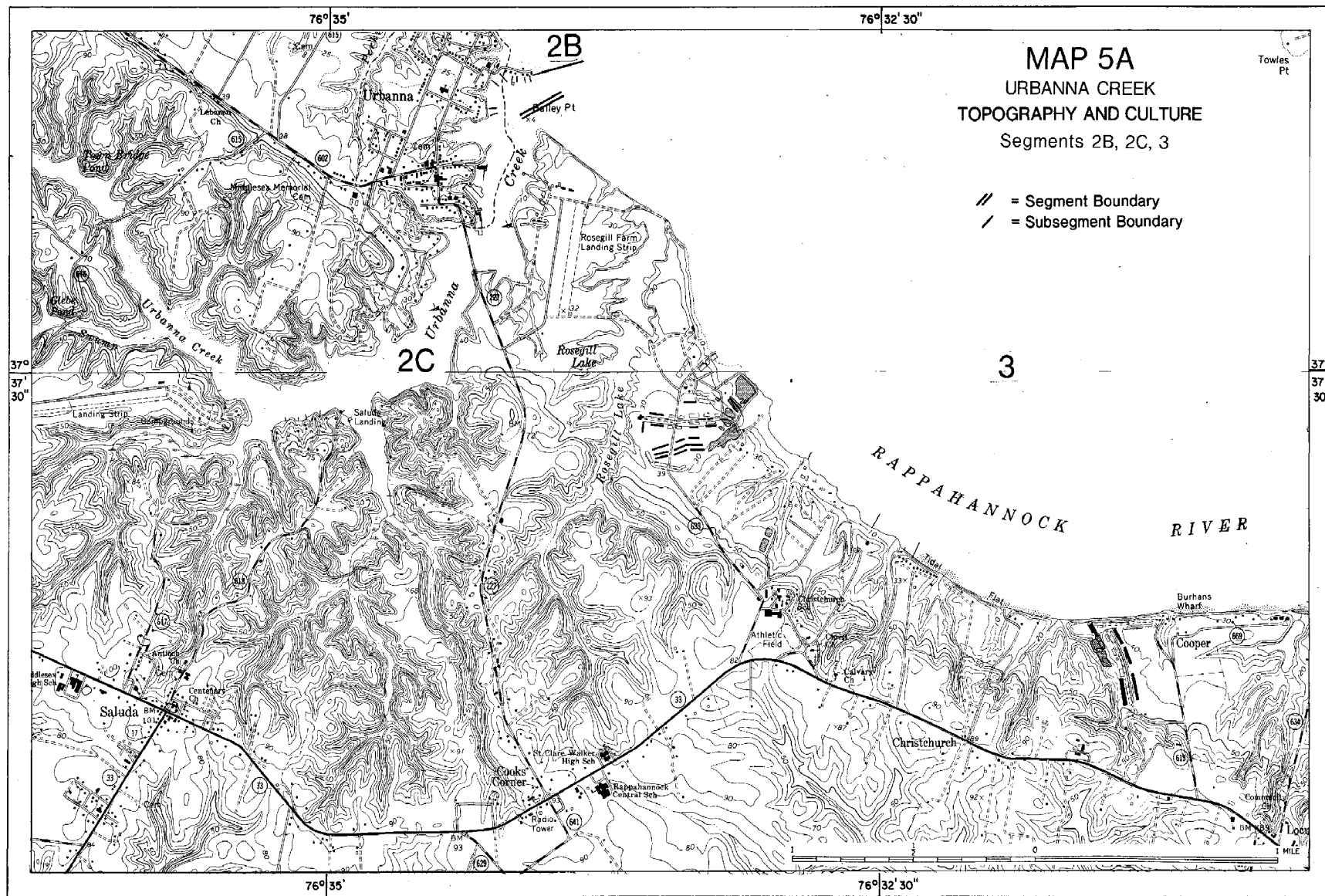


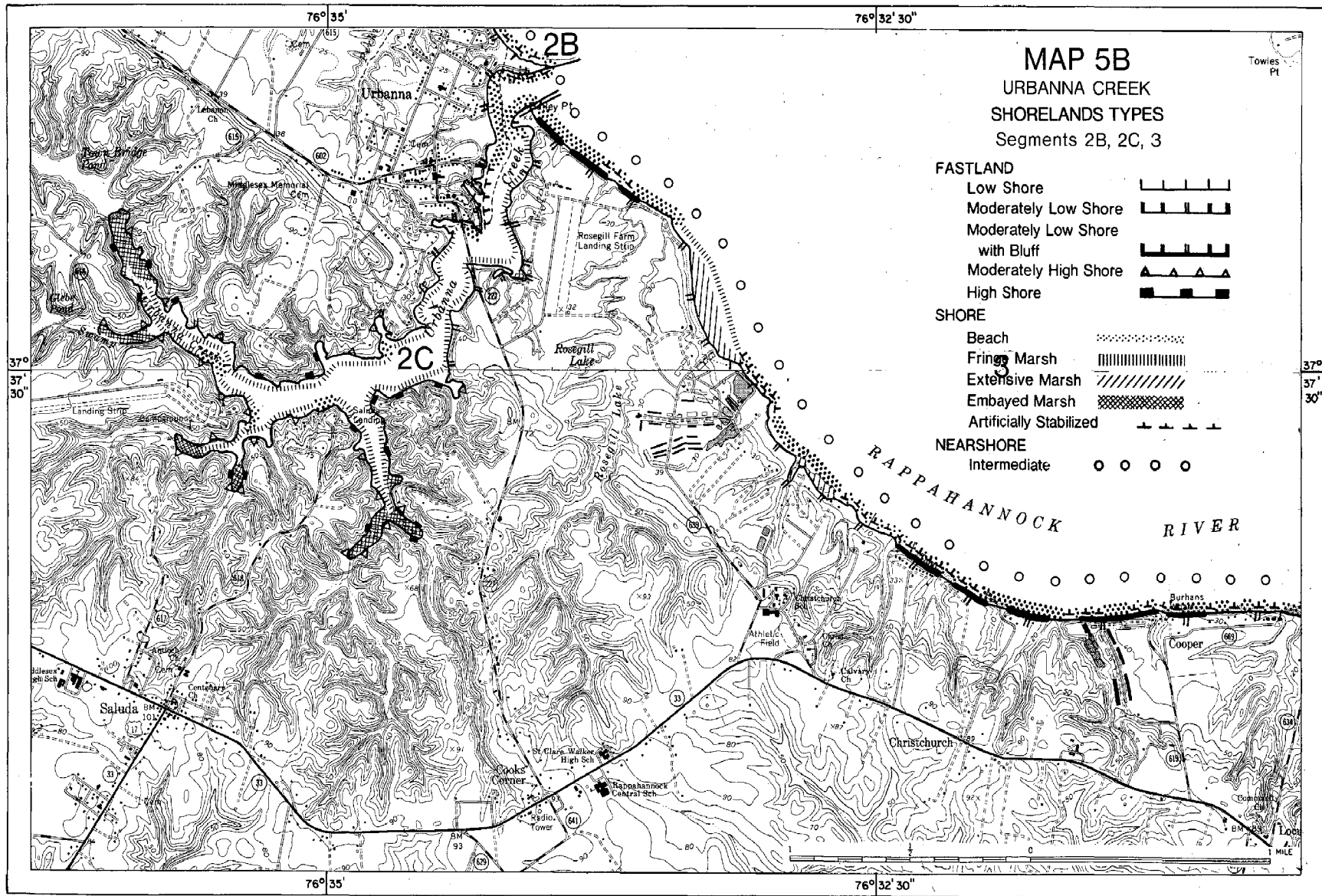


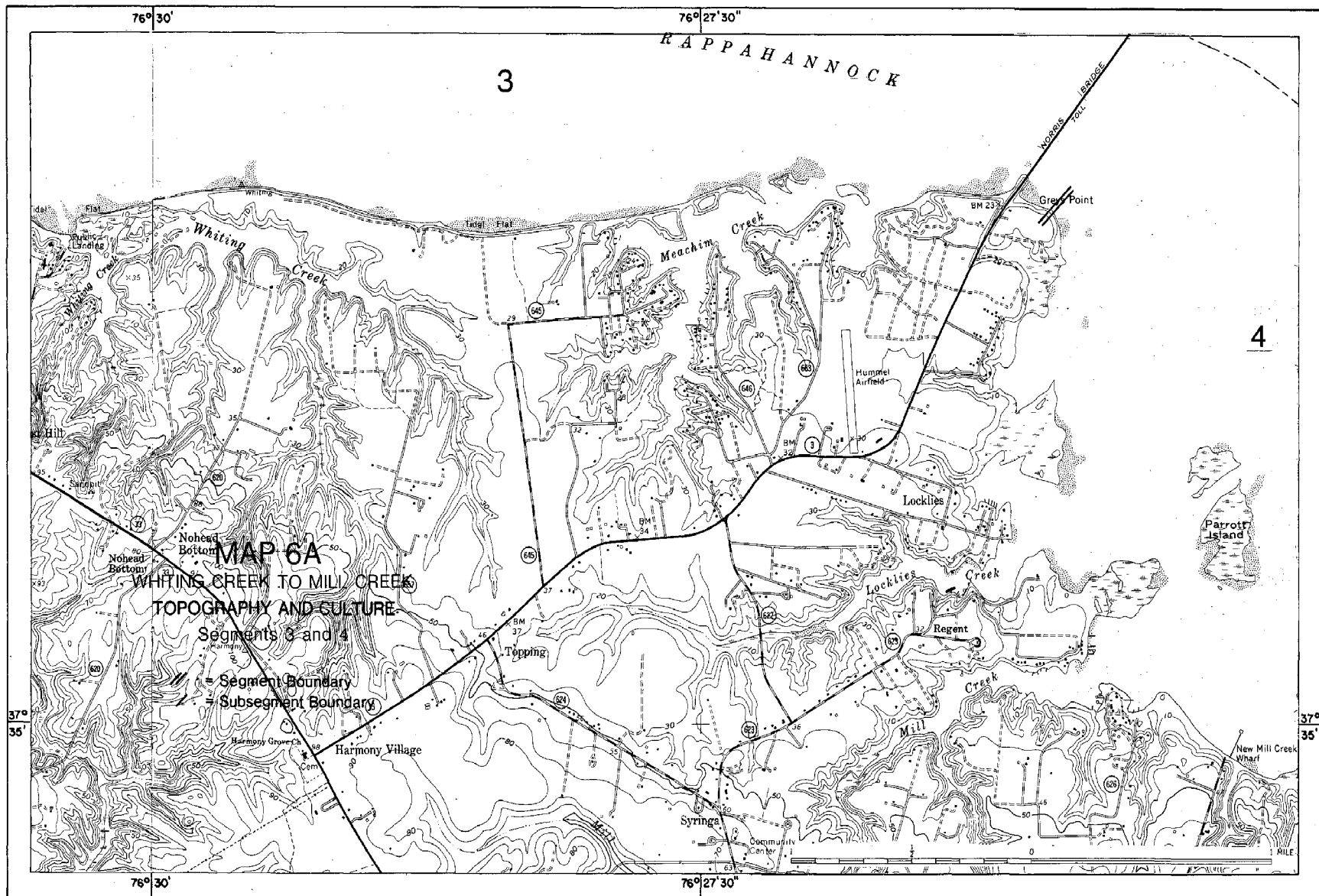


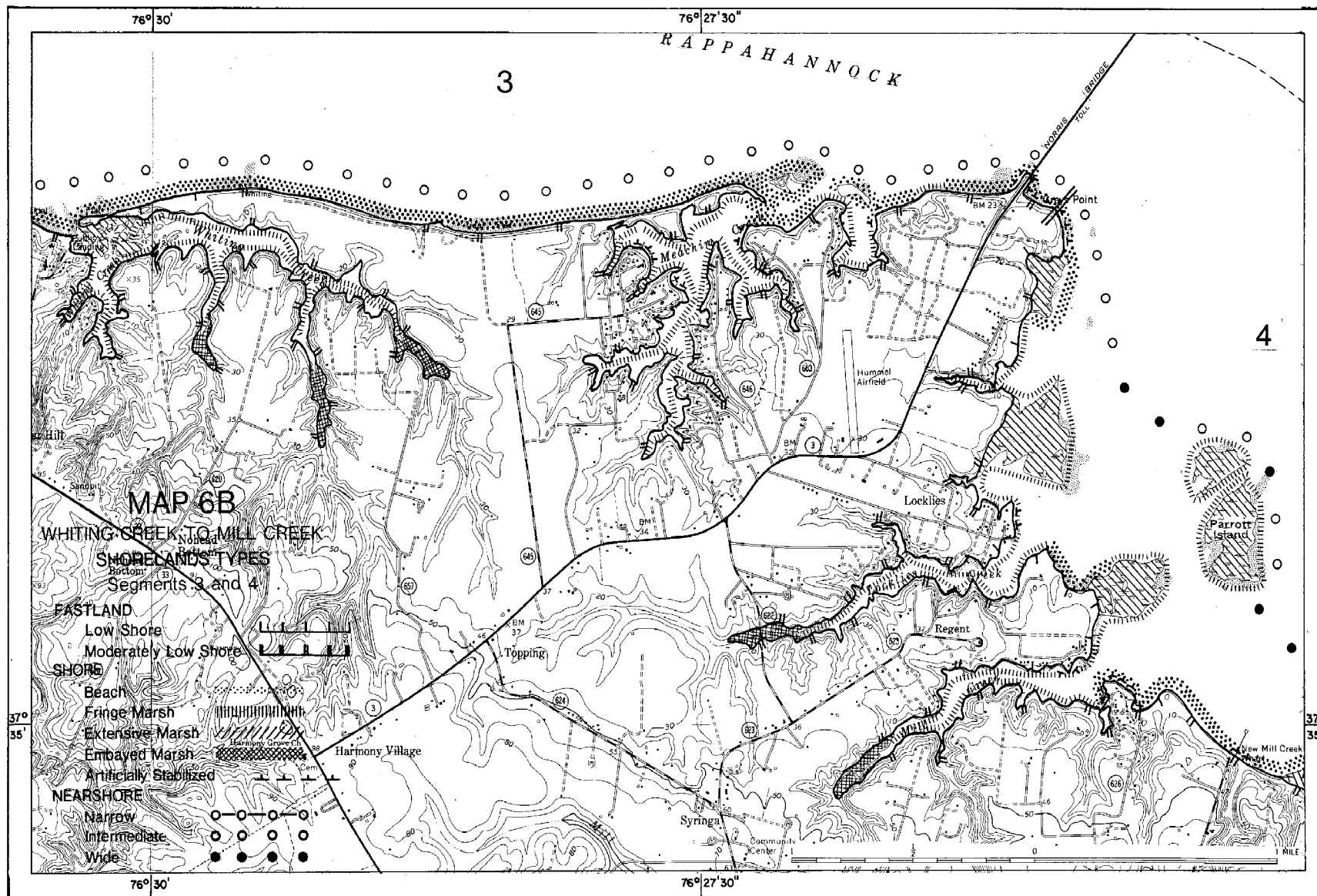


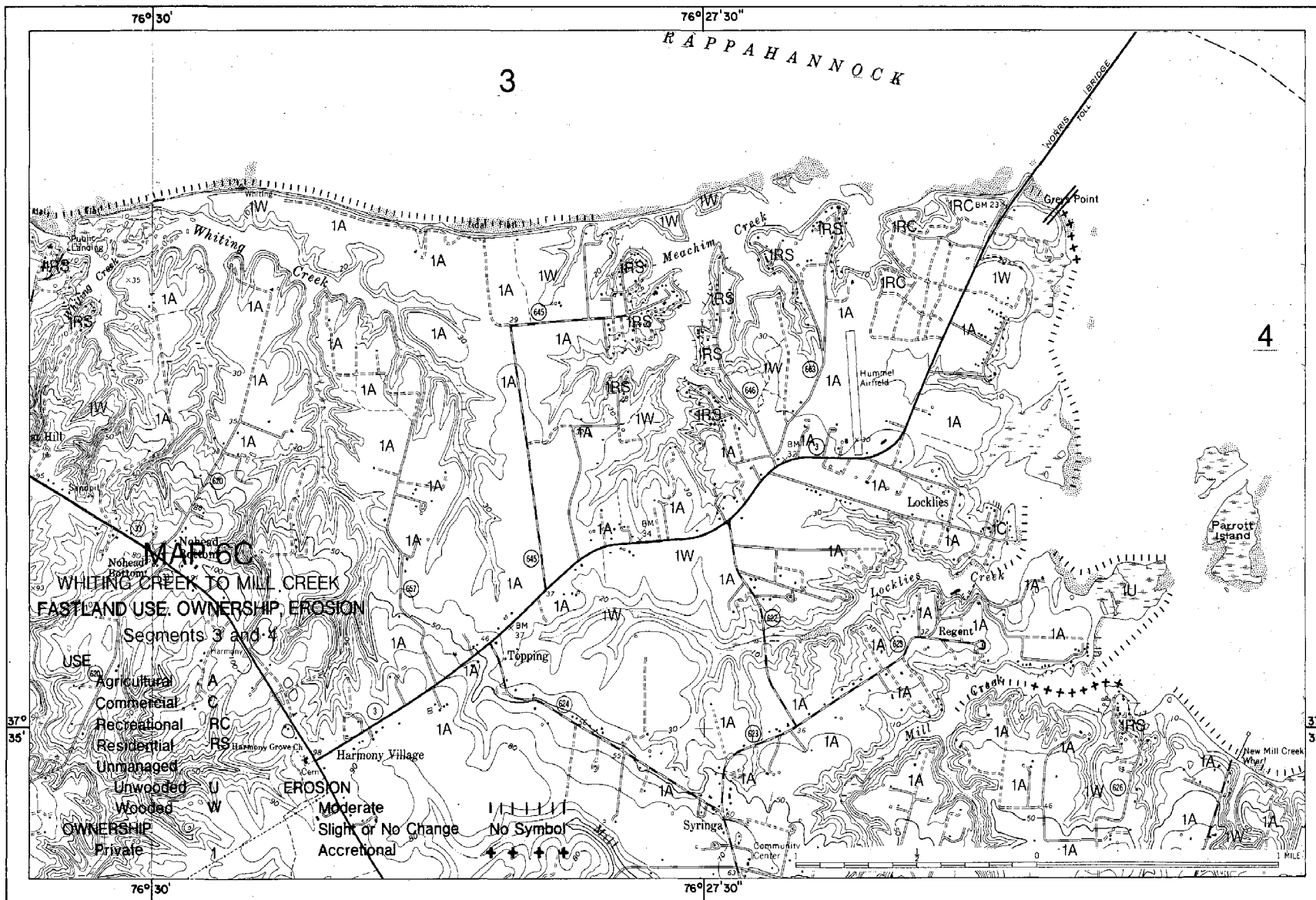


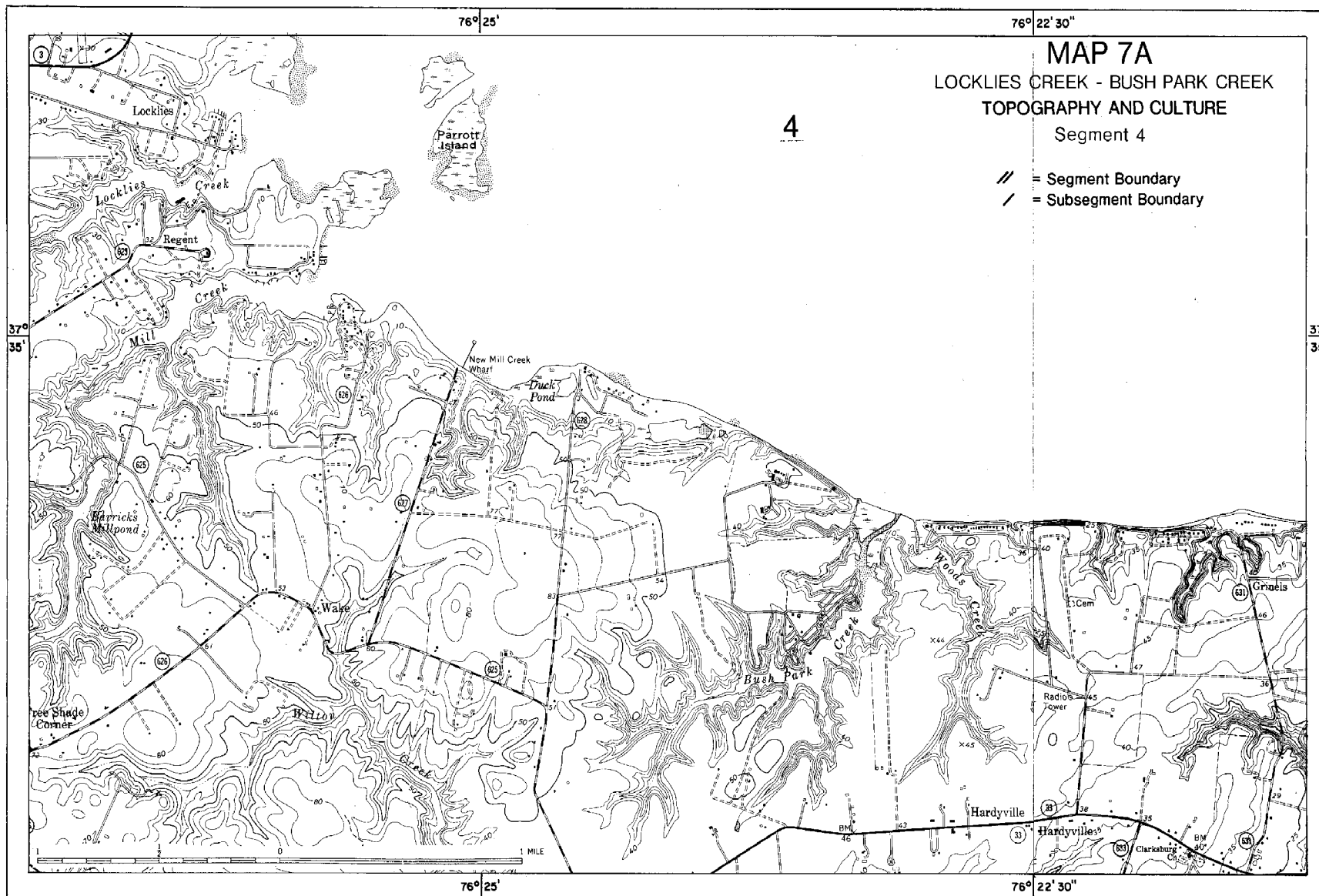


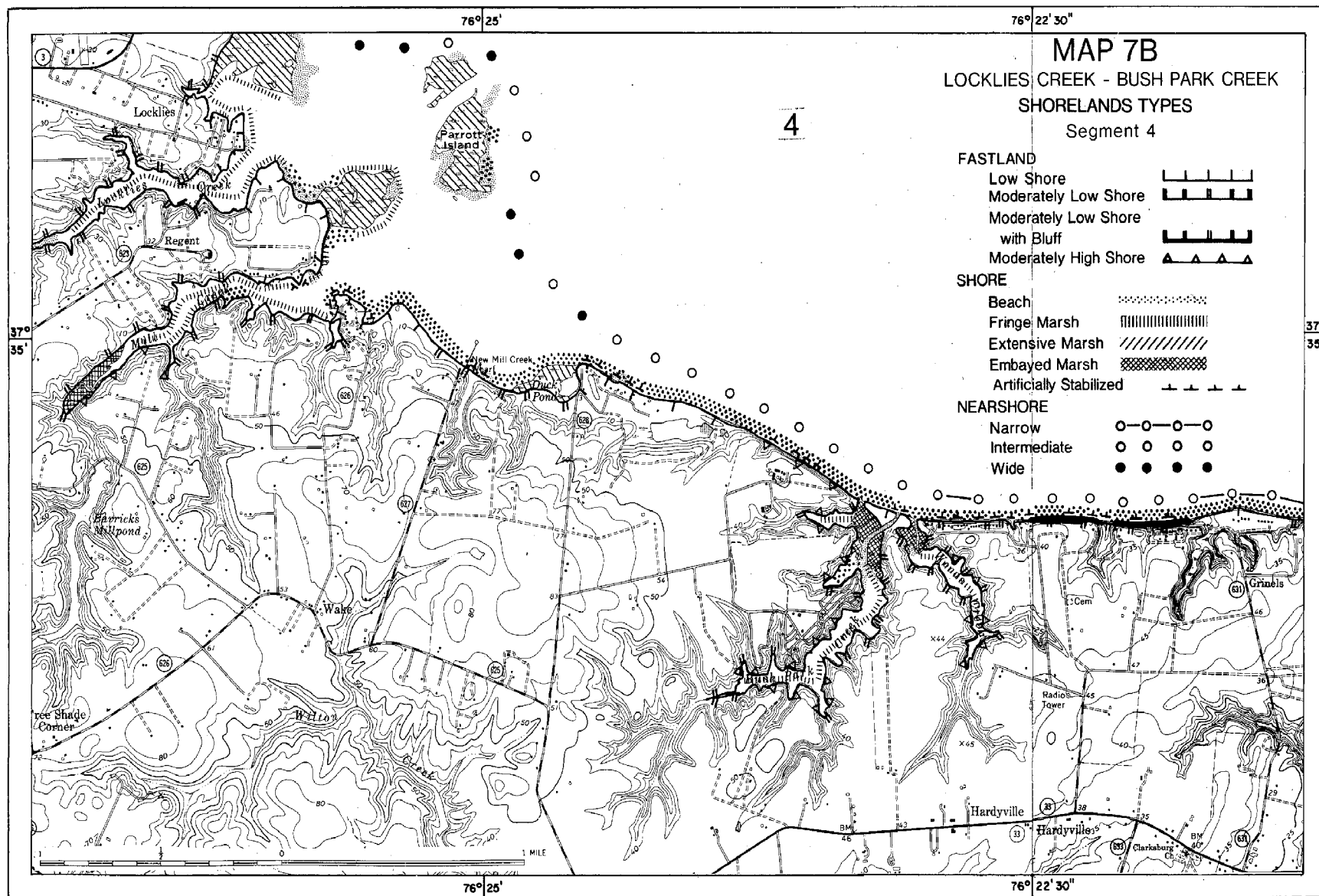


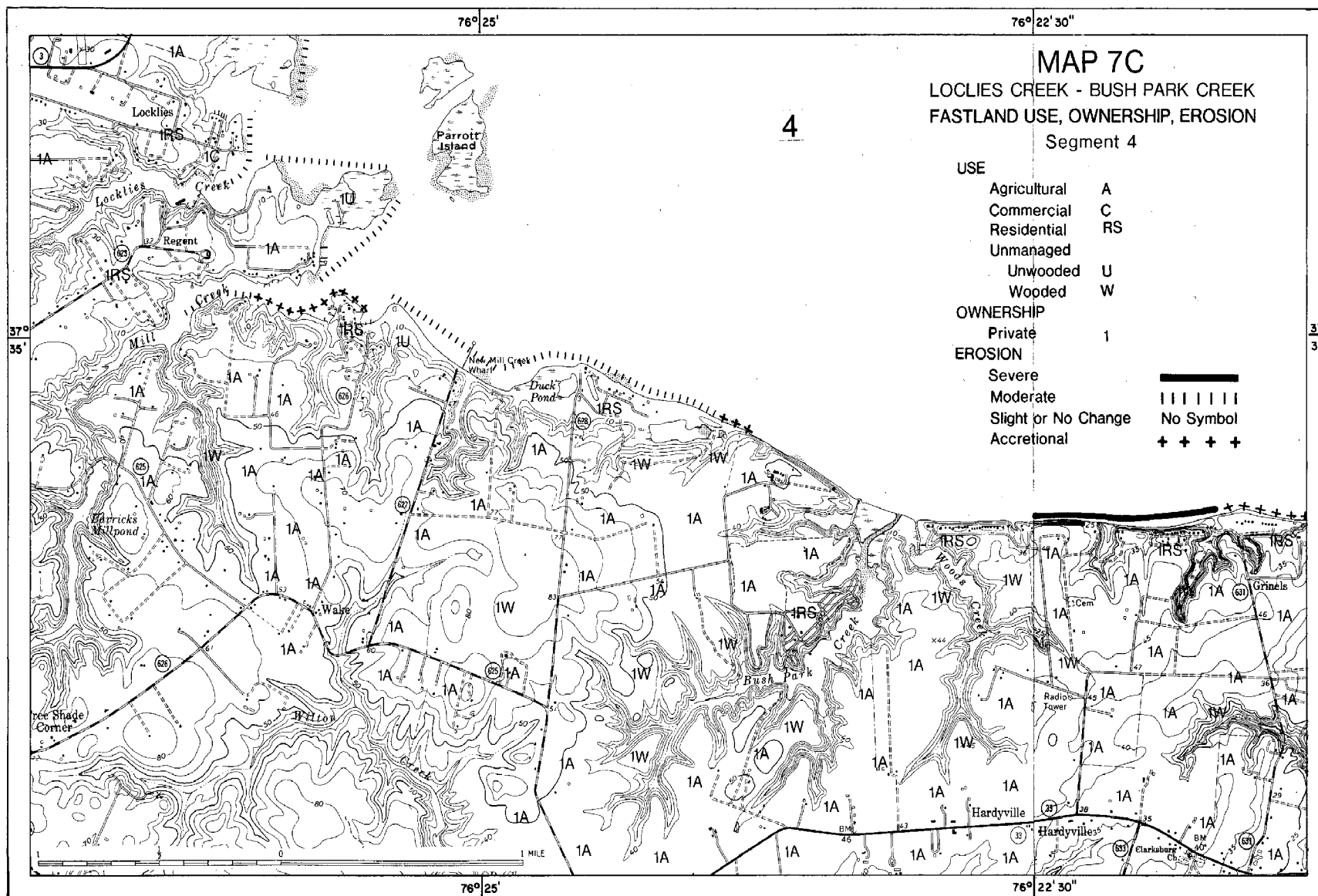




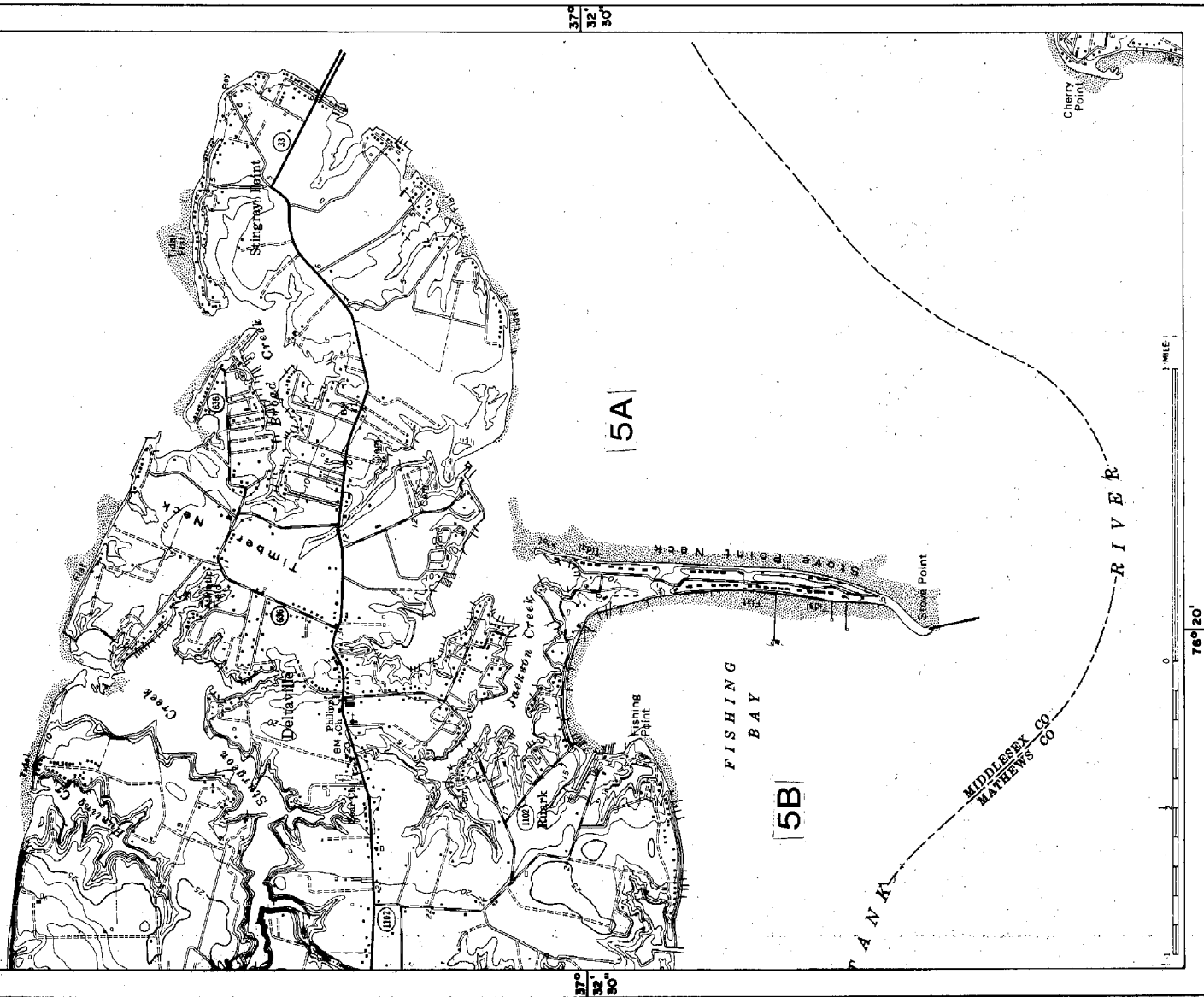


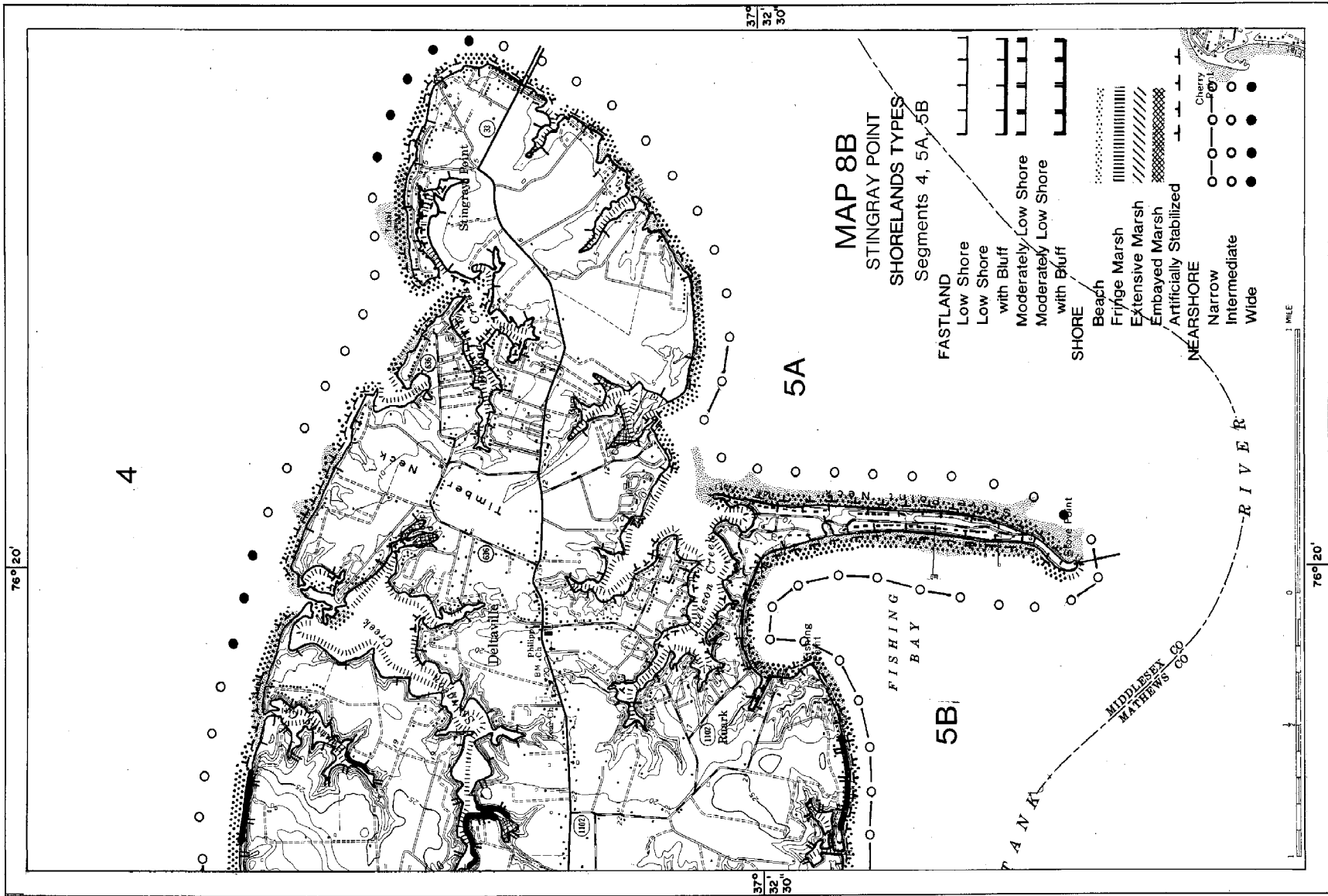


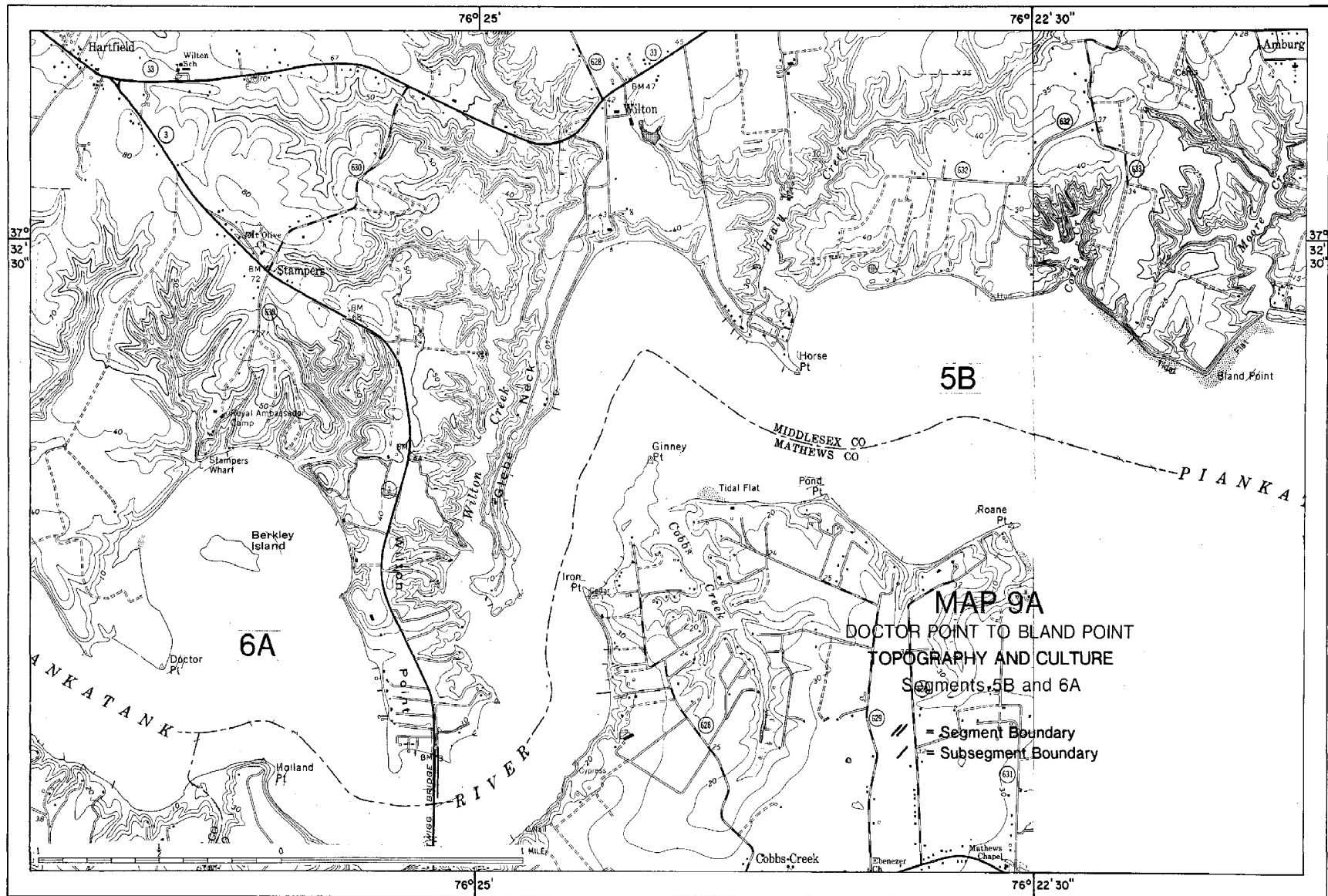


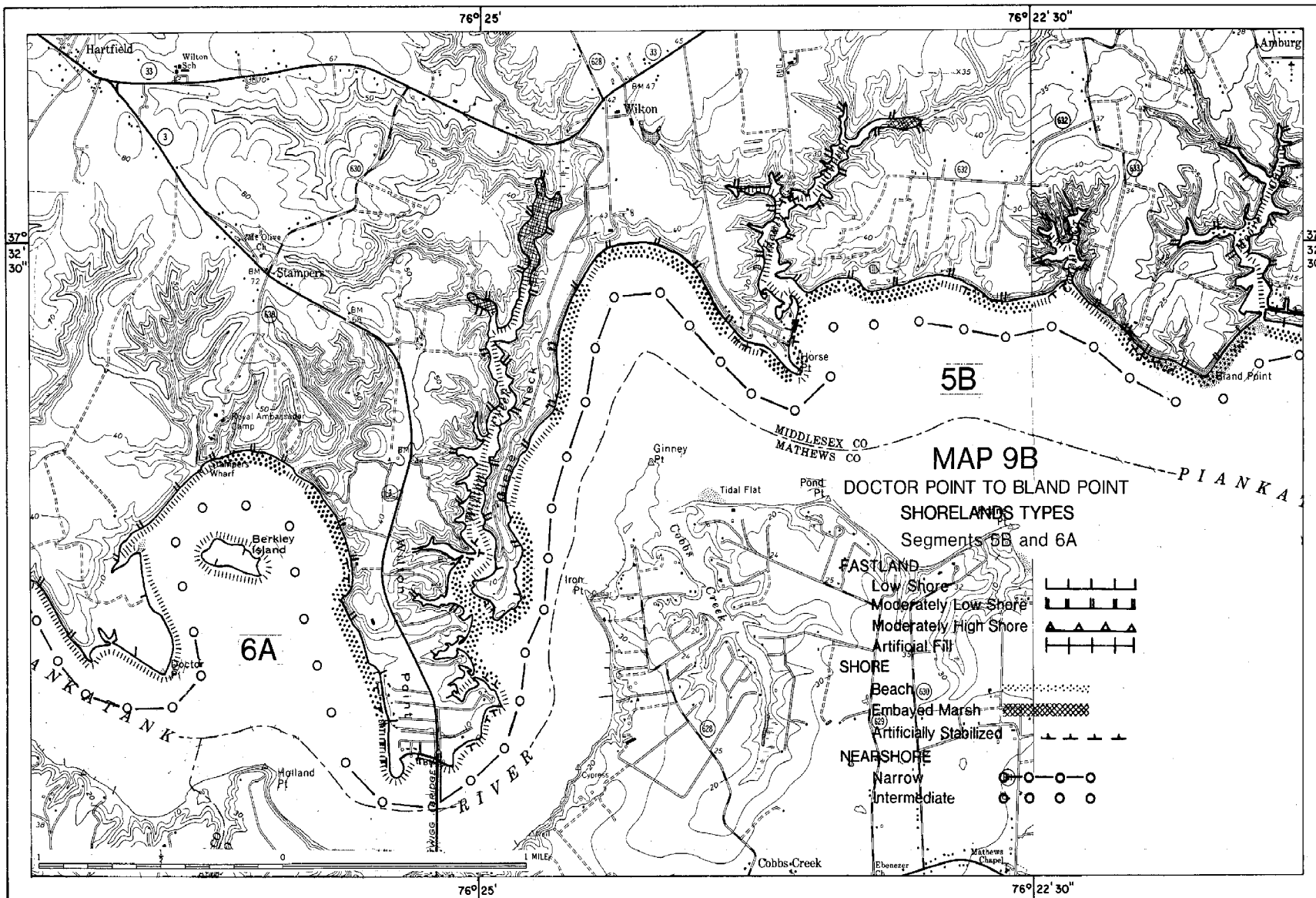


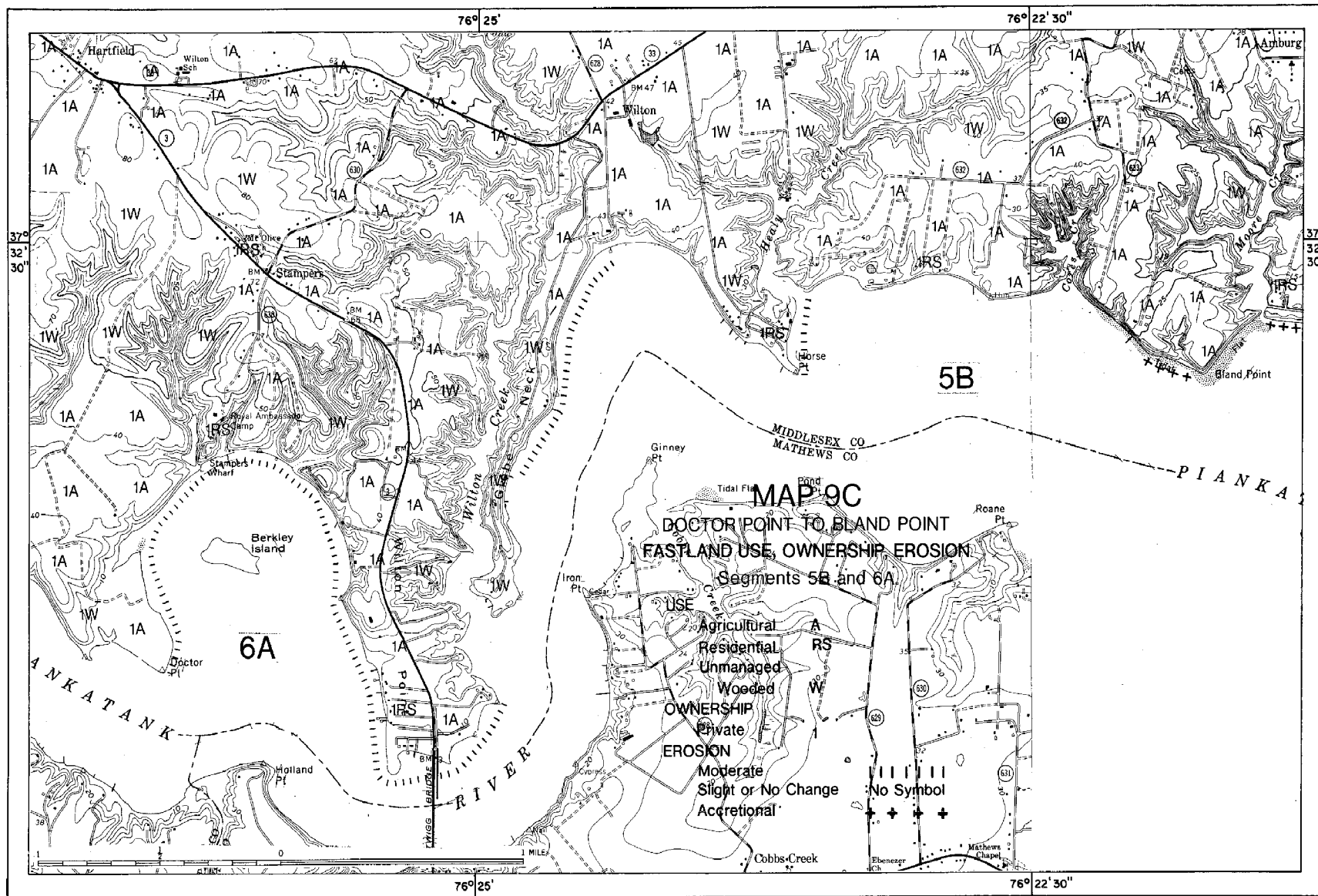
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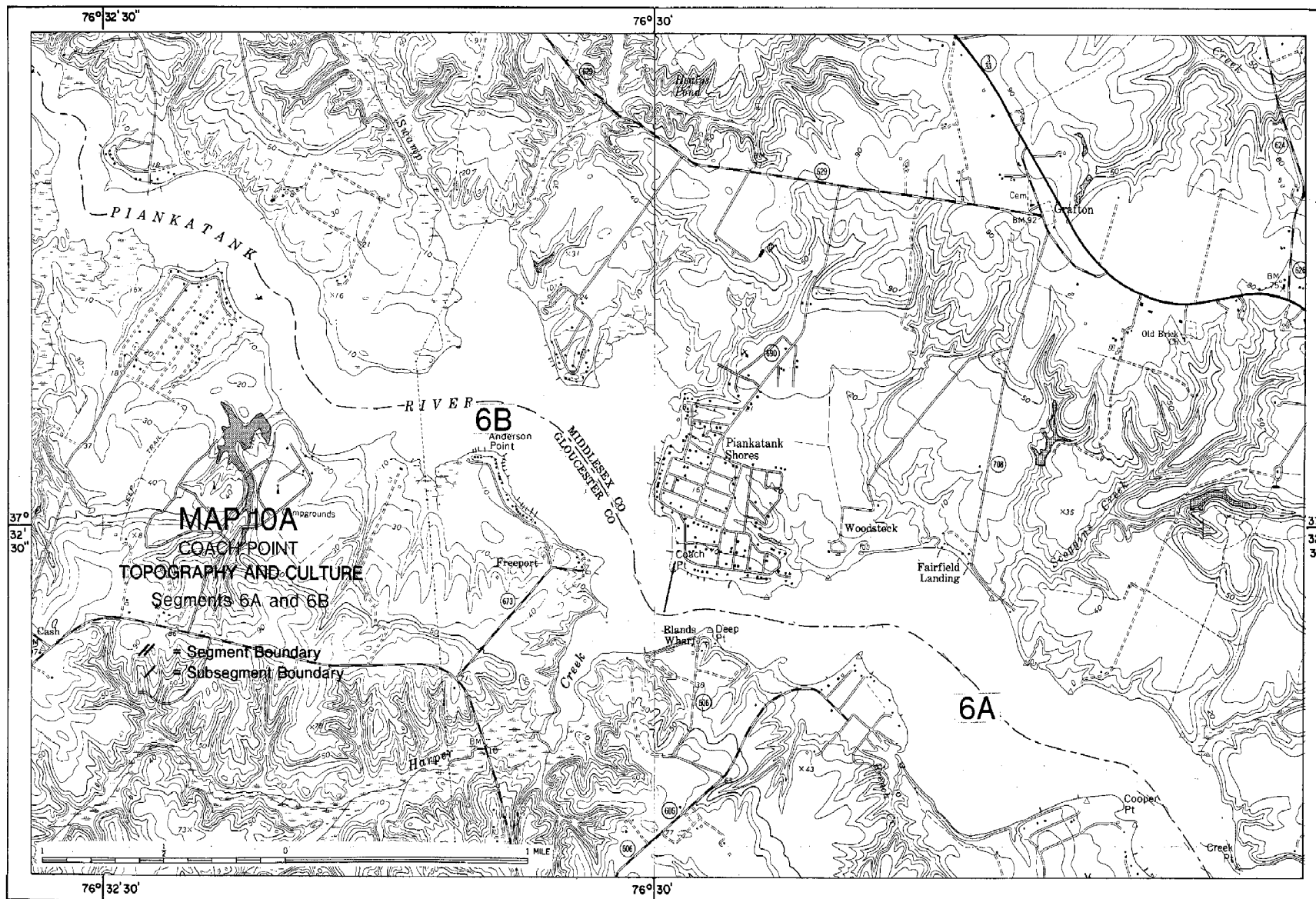


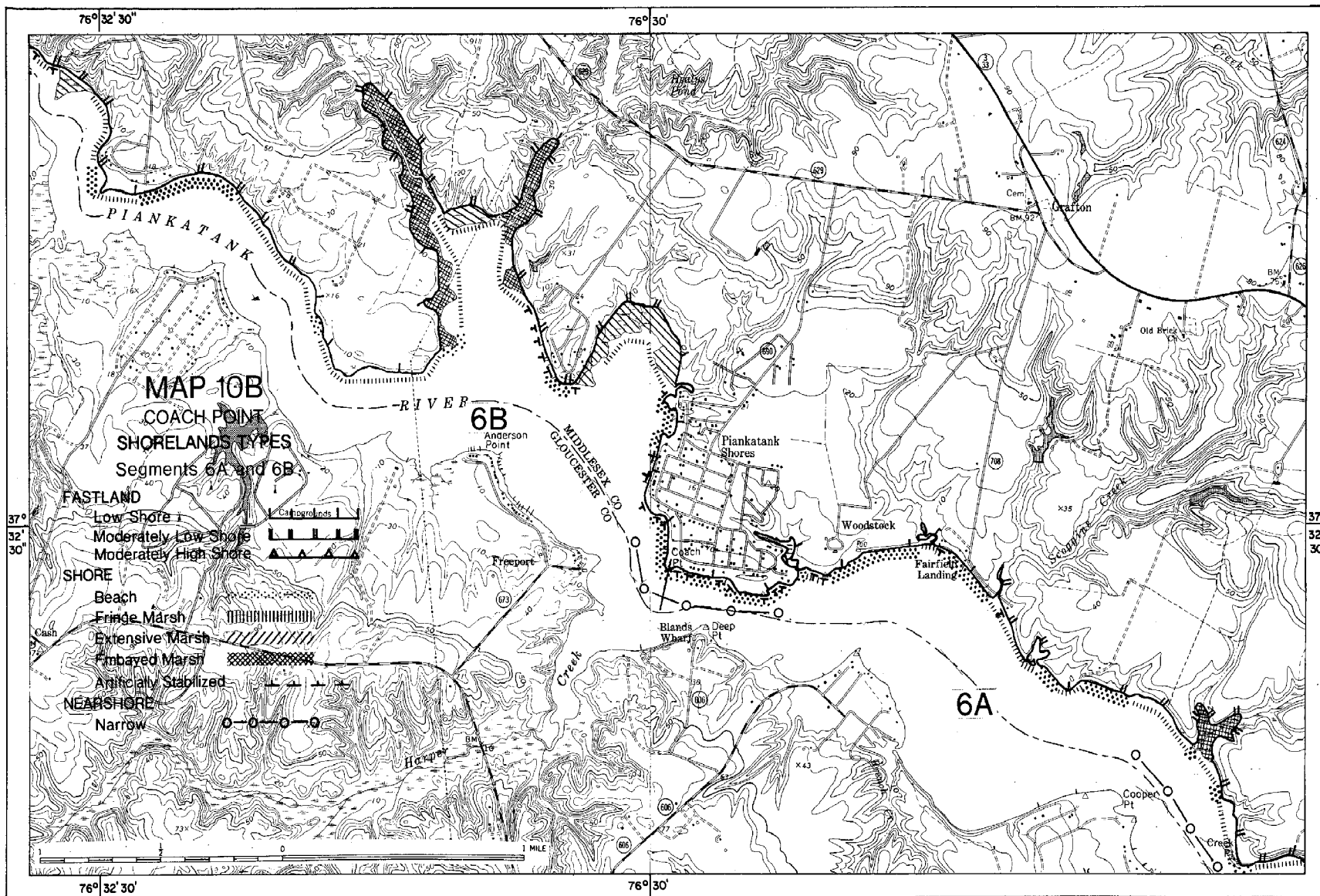


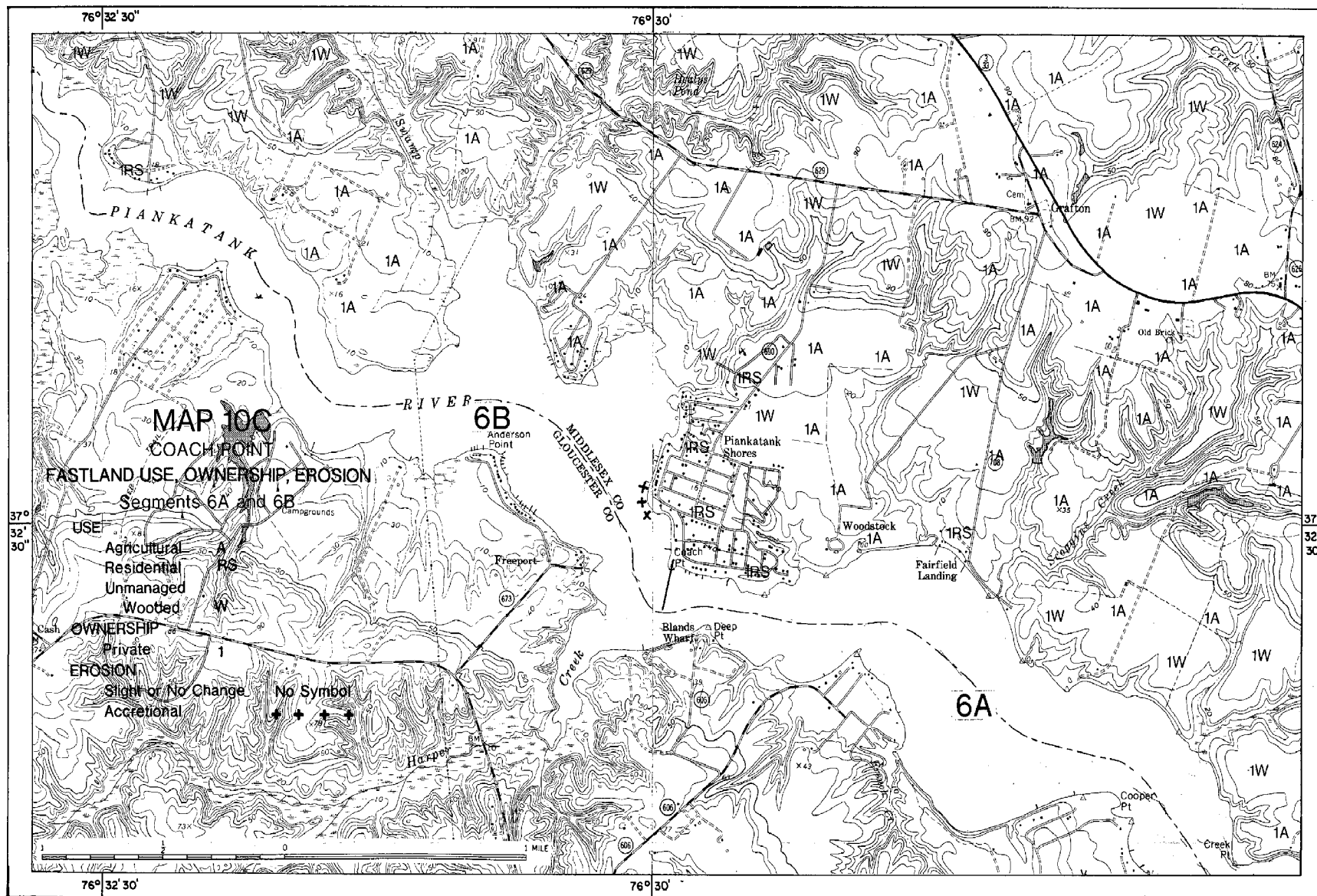


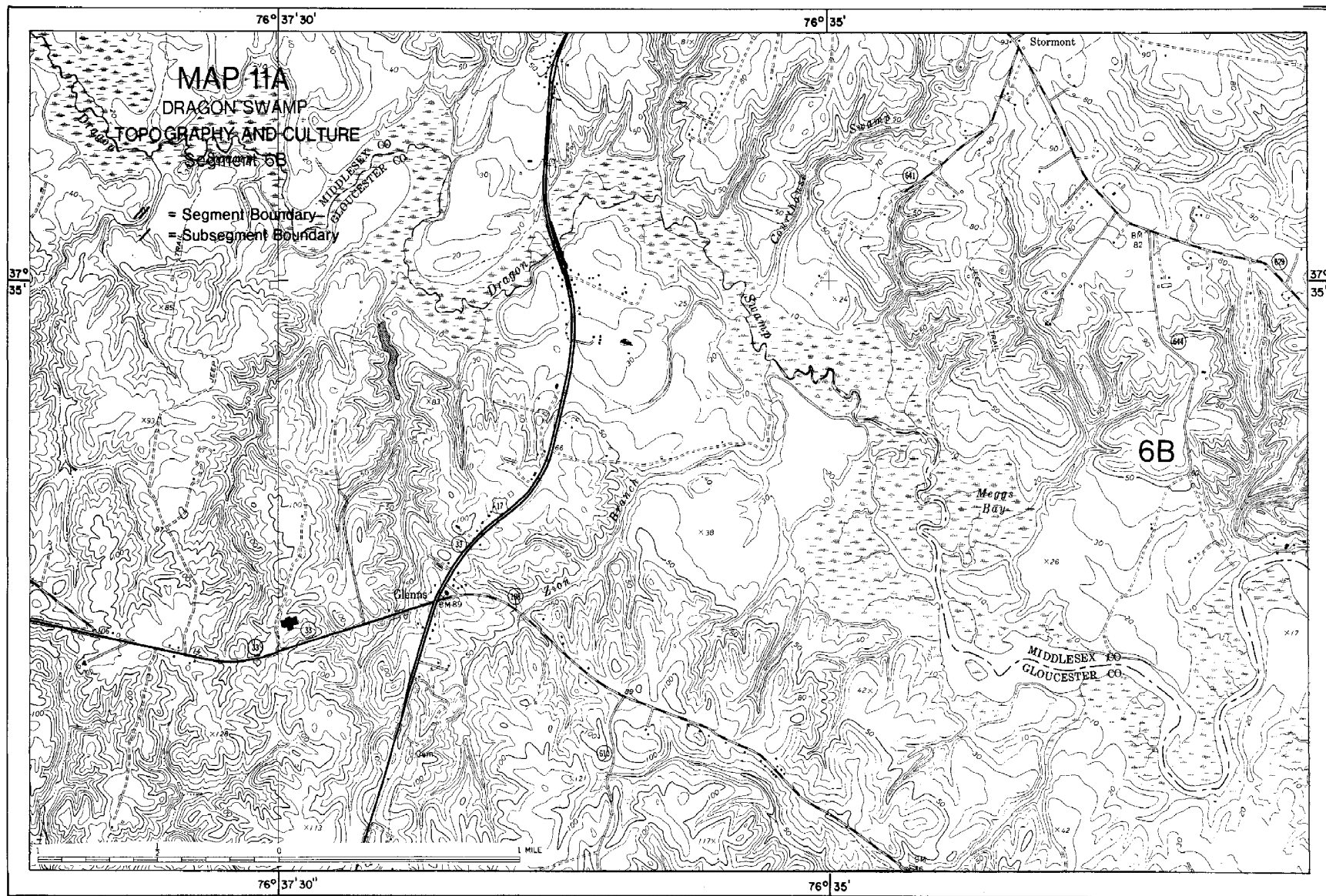


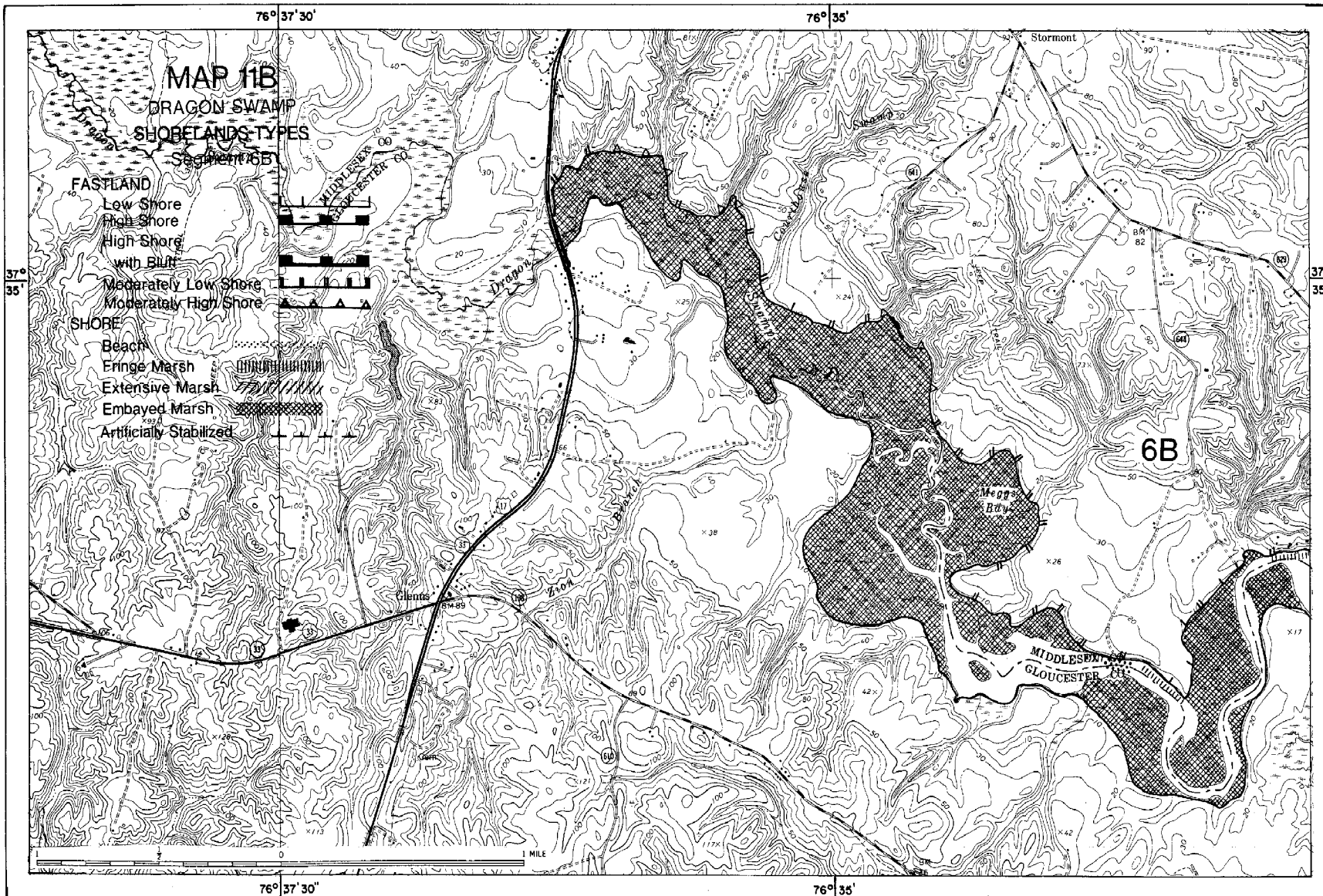


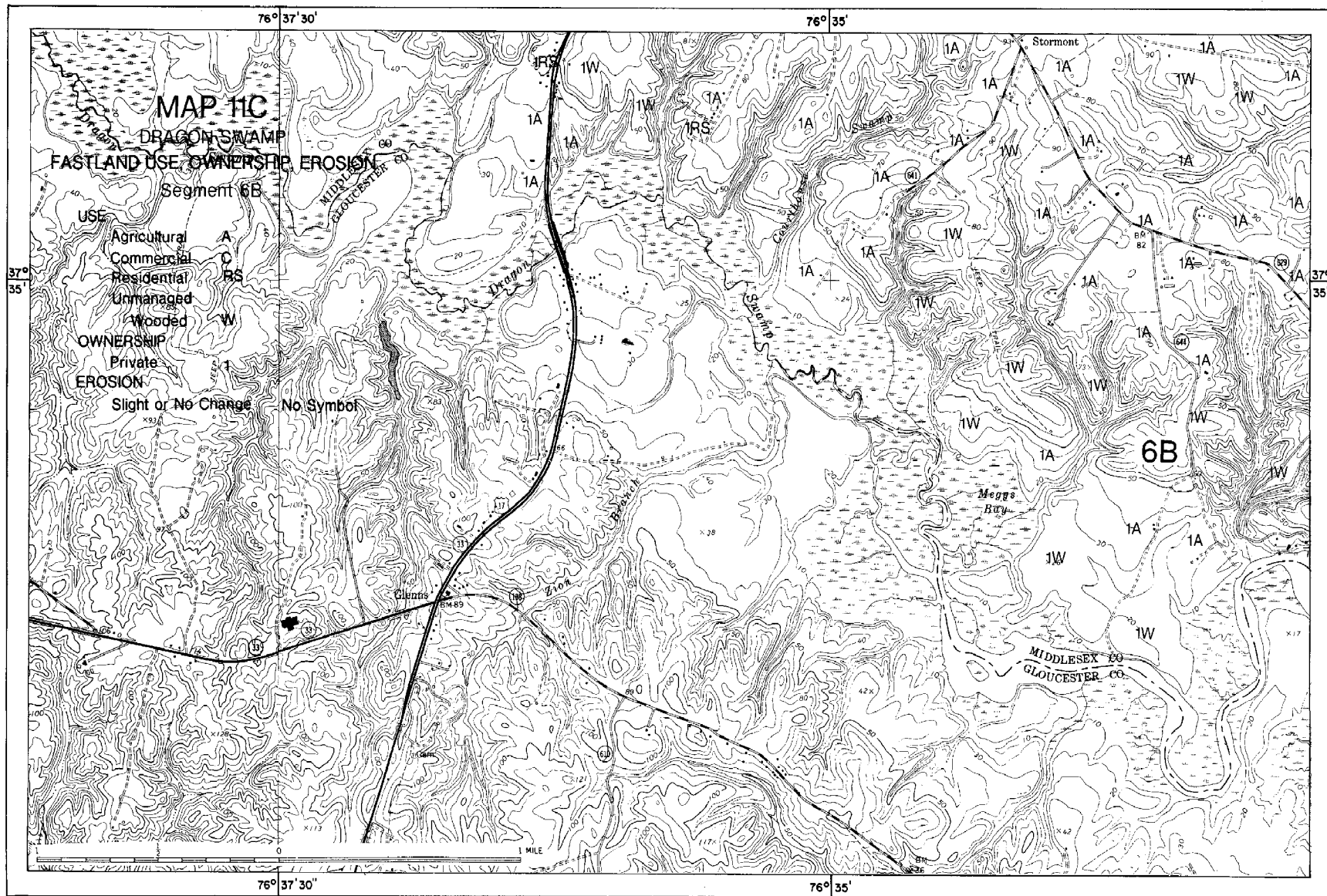












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